

SEQUENCE LISTING

<110> Hey, Timothy
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<120> Mixing and Matching TC Proteins for Pest Control

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<150> US 60/441,723

<151> 2003-01-21

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<170> PatentIn version 3.2

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gcattaacac aggtcattac tcaggcgaaa actgcgcagg aagatctggg ttccgccagc 840

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tggctgcgtc gtgtcatggc gttgtcgcgt cagactggcc tgtcagtgc accgttaatg  1440
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<210> 8
<211> 511
<212> PRT
<213> Xenorhabdus nematophilus

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<400> 8

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Asp Gln Val Phe Asn Gln Pro Lys Leu Phe Asp Glu Pro Phe Phe Val
1           5           10           15

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```

Asp Asn Arg Thr Phe Asp Tyr Asn Ala Ile Arg Gly Asn Asp Ala Arg
20           25           30

```

```

Thr Ile Lys Gln Leu Cys Ala Gly Leu Lys Ile Thr Val Ala Thr Phe
35           40           45

```

```

Gln Leu Leu Ala Glu Gln Val Asn Thr Ala Phe His Leu Pro Ser Gly
50           55           60

```

```

Lys Leu Thr Cys Ser Leu Pro Val Ile Ser Ala Leu Tyr Arg Leu Val
65           70           75           80

```

```

Thr Val Pro Arg Leu Phe Asn Leu Thr Ala Glu Gln Gly Met Met Leu
85           90           95

```

Ile Asn Ala Leu Asn Ala Ser Glu Lys Phe Ser Pro His Ile Leu Ala
 100 105 110

Gly Glu Pro Arg Leu Ser Leu Leu Thr Thr Glu Gly Ser Asp Thr Thr
 115 120 125

Glu Val Asp Leu Leu Asp Val Ile Leu Met Leu Glu Glu Val Ala Val
 130 135 140

Trp Leu Gln Gln Ser Lys Leu Lys Pro Glu Glu Phe Cys Leu Met Leu
 145 150 155 160

Gln Ser Val Met Leu Pro Val Val Ala Thr Asp Ser Ser Val Thr Phe
 165 170 175

Phe Asp Asn Leu Leu Gln Gly Ile Pro Lys Thr Leu Leu Thr Glu Asp
 180 185 190

Asn Phe Asn Ala Gly Asp Ile Pro Arg Leu Pro Glu Gly Glu Thr Trp
 195 200 205

Phe Asp Lys Leu Ser Met Leu Ile Thr Ser Asp Gly Leu Val Asn Val
 210 215 220

Tyr Pro Leu Ser Trp Gly Gln Ser Asp Glu Asp Tyr Leu Lys Ser Val
 225 230 235 240

Leu Thr Pro Val Val Glu Lys Ile Ile Ser Asp Pro Asn Ser Val Ile
 245 250 255

Ile Thr Val Ser Ala Leu Thr Gln Val Ile Thr Gln Ala Lys Thr Ala
 260 265 270

Gln Glu Asp Leu Val Ser Ala Ser Val Thr Arg Glu Tyr Gly Thr Gly
 275 280 285

Arg Asp Ile Val Pro Trp Leu Leu Arg Trp Ile Gly Ser Ser Val Pro
 290 295 300

Asp Phe Leu Gly Lys Ile Tyr Ile Gln Gly Ala Thr Arg Gly Gly His
 305 310 315 320

Leu Arg Thr Pro Pro Asp Ile Ser Ala Glu Leu Leu His Ile Thr Tyr

	325		330		335										
His	Leu	Ala	Met	Asn	Asn	Met	Leu	Ile	Lys	Gln	Leu	Arg	Leu	Lys	Ala
			340					345					350		
Gln	Ile	Ile	Ser	Leu	Arg	Ile	Ile	Met	Pro	Glu	Trp	Leu	Gly	Leu	Pro
			355					360					365		
Thr	Ile	Asp	Gly	Ser	Pro	Leu	Ser	Val	His	Glu	Ile	Trp	Ala	Leu	Ser
			370					375				380			
Arg	Phe	Arg	Asn	Trp	Ala	Thr	Ser	Ser	Leu	Phe	Ser	Glu	Asp	Glu	Leu
			385					390				395			400
Ile	Glu	Tyr	Phe	Ala	Phe	Ala	Asn	Gln	Pro	Glu	Gln	Asp	Val	Arg	Asn
			405					410						415	
Asp	Glu	Asp	Phe	Asn	Arg	Asp	Cys	Ala	Glu	Lys	Leu	Ala	Asp	Ile	Leu
			420					425					430		
Glu	Trp	Asp	Ala	Asp	Glu	Ile	Glu	Leu	Ala	Thr	Arg	His	Phe	Asp	Pro
			435					440				445			
Ala	Pro	Ala	Arg	Ala	Arg	Asn	Met	Gly	Gln	Ile	Asp	Trp	Leu	Arg	Arg
			450					455				460			
Val	Met	Ala	Leu	Ser	Arg	Gln	Thr	Gly	Leu	Ser	Val	Thr	Pro	Leu	Met
			465					470				475			480
Thr	Ala	Ala	Thr	Leu	Pro	Pro	Phe	Pro	Pro	Tyr	Asp	Gln	Ile	Thr	His
			485					490						495	
Val	Gly	Glu	Ala	Val	Ile	Ala	Ala	Thr	Gln	Tyr	Pro	Ser	Glu	Glu	
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<210> 9
 <211> 4173
 <212> DNA
 <213> Xenorhabdus nematophilus

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<210> 10
<211> 1391
<212> PRT
<213> Xenorhabdus nematophilus

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<400> 10

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Met Ser Ser Val Thr Gln Pro Ile Glu Glu Arg Leu Leu Glu Ser Gln
1          5          10          15

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```

Arg Asp Ala Leu Leu Asp Phe Tyr Leu Gly Gln Val Val Ala Tyr Ser
20          25          30

```

```

Pro Asp Met Thr Ser Gln Arg Asp Lys Ile Lys Asp Ile Asp Asp Ala
35          40          45

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```

Cys Asp Tyr Leu Leu Leu Asp Leu Leu Thr Ser Ala Lys Val Lys Ala
50          55          60

```

```

Thr Arg Leu Ser Leu Ala Thr Asn Ser Leu Gln Gln Phe Val Asn Arg
65          70          75          80

```

```

Val Ser Leu Asn Ile Glu Pro Gly Leu Phe Met Thr Ala Glu Glu Ser
85          90          95

```

```

Glu Asn Trp Gln Glu Phe Ala Asn Arg Tyr Asn Tyr Trp Ser Ala Asp
100          105          110

```

Arg Leu Leu Arg Thr Tyr Pro Glu Ser Tyr Leu Glu Pro Leu Leu Arg
 115 120 125

Leu Asn Lys Thr Glu Phe Phe Phe Gln Leu Glu Ser Ala Leu Asn Gln
 130 135 140

Gly Lys Ile Thr Glu Asp Ser Val Gln Gln Ala Val Leu Gly Tyr Leu
 145 150 155 160

Asn Asn Phe Glu Asp Val Ser Asn Leu Lys Val Ile Ala Gly Tyr Glu
 165 170 175

Asp Gly Val Asn Ile Lys Arg Asp Lys Phe Phe Phe Val Gly Arg Thr
 180 185 190

Arg Thr Gln Pro Tyr Gln Tyr Tyr Trp Arg Ser Leu Asn Leu Ser Ile
 195 200 205

Arg His Pro Asp Thr Asp Ala Leu Ser Pro Asn Ala Trp Ser Glu Trp
 210 215 220

Lys Pro Ile Asp Leu Pro Leu Gly Ser Val Asp Pro Asn Leu Ile Arg
 225 230 235 240

Pro Ile Phe Leu Asn Asn Arg Leu Tyr Ile Ala Trp Thr Glu Val Glu
 245 250 255

Glu Gln Ser Glu Thr Lys Asp Thr Thr Ala Leu Ser Leu His Asn Gln
 260 265 270

Asn Val Glu Pro Ser Ala Gly Asp Trp Val Pro Pro Thr Pro Phe Leu
 275 280 285

Thr Arg Ile Lys Ile Ala Tyr Ala Lys Tyr Asp Gly Ser Trp Ser Thr
 290 295 300

Pro Thr Ile Leu Arg Glu Asp Asn Leu Gln Tyr Arg Met Ala Gln Met
 305 310 315 320

Val Ala Val Met Asp Ile Gln Gln Asp Pro His Asn Pro Phe Leu Ala
 325 330 335

Leu Val Pro Phe Val Arg Leu Gln Gly Thr Asp Lys Lys Gly Lys Asp
 340 345 350

Tyr Asp Tyr Asp Glu Ala Phe Gly Tyr Val Cys Asp Thr Leu Leu Val
 355 360 365

Glu Ile Thr Asp Leu Pro Asp Asp Glu Tyr Ala Asp Gly Arg Lys Gly
 370 375 380

Lys Tyr Val Gly Asn Leu Val Trp Tyr Tyr Ser Arg Glu His Lys Asp
 385 390 395 400

Ala Glu Gly Asn Pro Ile Asp Tyr Arg Thr Met Val Leu Tyr Pro Ala
 405 410 415

Thr Arg Glu Glu Arg Phe Pro Ile Ala Gly Glu Ala Lys Pro Glu Gly
 420 425 430

Ser Pro Asp Phe Gly Lys Asp Ser Ile Lys Leu Ile Val Asn Phe Val
 435 440 445

His Gly Thr Asp Asp Thr Leu Glu Ile Val Ala Gln Ser Asp Phe Lys
 450 455 460

Phe Gly Ala Ile Glu Asp His Gln Tyr Tyr Asn Gly Ser Phe Arg Leu
 465 470 475 480

Met His Asp Asn Thr Val Leu Asp Glu Gln Pro Leu Val Leu Asn Glu
 485 490 495

Lys Val Pro Asp Leu Thr Tyr Pro Ser Ile Lys Leu Gly Ser Asp Asn
 500 505 510

Arg Ile Thr Leu Lys Ala Glu Leu Leu Phe Lys Pro Lys Gly Gly Val
 515 520 525

Gly Asn Glu Ser Ala Ser Cys Thr Gln Glu Phe Arg Ile Gly Met His
 530 535 540

Ile Arg Glu Leu Ile Lys Leu Asn Glu Gln Asp Gln Val Gln Phe Leu
 545 550 555 560

Ser Phe Pro Ala Asp Glu Thr Gly Asn Ala Pro Gln Asn Ile Arg Leu

565

570

575

Asn Thr Leu Phe Ala Lys Lys Leu Ile Ala Ile Ala Ser Gln Gly Ile
 580 585 590

Pro Gln Val Leu Ser Trp Asn Thr Gln Leu Ile Thr Glu Gln Pro Ile
 595 600 605

Pro Gly Ser Phe Pro Thr Pro Ile Asp Leu Asn Gly Ala Asn Gly Ile
 610 615 620

Tyr Phe Trp Glu Leu Phe Phe His Met Pro Phe Leu Val Ala Trp Arg
 625 630 635 640

Leu Asn Ile Glu Gln Arg Leu Lys Glu Ala Thr Glu Trp Leu His Tyr
 645 650 655

Ile Phe Asn Pro Leu Glu Asp Glu Leu Val Gln Ala Ser Asn Gln Gly
 660 665 670

Lys Pro Arg Tyr Trp Asn Ser Arg Pro Ile Ile Asp Pro Pro Pro Thr
 675 680 685

Val Tyr Arg Met Leu Ile Glu Pro Thr Asp Pro Asp Ala Ile Ala Ala
 690 695 700

Ser Glu Pro Ile His Tyr Arg Lys Ala Ile Phe Arg Phe Tyr Val Lys
 705 710 715 720

Asn Leu Leu Asp Gln Gly Asp Met Glu Tyr Arg Lys Leu Thr Ser Ser
 725 730 735

Ala Arg Thr Val Ala Lys Gln Ile Tyr Asp Ser Val Asn Met Leu Leu
 740 745 750

Gly Thr Ser Pro Asp Ile Leu Leu Ala Ala Asn Trp Gln Pro Arg Thr
 755 760 765

Leu Gln Asp Val Ala Leu Tyr Glu Asn Ser Glu Ala Arg Ala Gln Glu
 770 775 780

Leu Met Leu Thr Val Ser Ser Val Pro Leu Leu Pro Val Thr Tyr Asp
 785 790 795 800

Thr Ser Val Ser Ala Ala Pro Ser Asp Leu Phe Val Lys Pro Val Asp
805 810 815

Thr Glu Tyr Leu Lys Leu Trp Gln Met Leu Asp Gln Arg Leu Tyr Asn
820 825 830

Leu Arg His Asn Leu Thr Leu Asp Gly Lys Glu Phe Pro Ala Gly Leu
835 840 845

Tyr Asp Glu Pro Ile Ser Pro Gln Asp Leu Leu Arg Gln Arg Tyr Gln
850 855 860

Arg Val Val Ala Asn Arg Met Ala Gly Met Lys Arg Arg Ala Ile Pro
865 870 875 880

Asn Tyr Arg Phe Thr Pro Ile Met Ser Arg Ala Lys Glu Ala Ala Glu
885 890 895

Thr Leu Ile Gln Tyr Gly Ser Thr Leu Leu Ser Leu Leu Glu Lys Lys
900 905 910

Asp Asn Thr Asp Phe Glu His Phe Arg Met Gln Gln Gln Leu Gly Leu
915 920 925

Tyr Ser Phe Thr Arg Asn Leu Gln Gln Gln Ala Ile Asp Met Gln Gln
930 935 940

Ala Ser Leu Asp Ala Leu Thr Ile Ser Arg Arg Ala Ala Gln Glu Arg
945 950 955 960

Gln Gln His Tyr Lys Ser Leu Tyr Asp Glu Asn Ile Ser Ile Thr Glu
965 970 975

Gln Glu Val Ile Ala Leu Gln Ser Arg Ala Ala Glu Gly Val Ile Ala
980 985 990

Ala Gln Ser Ala Ala Thr Ala Ala Ala Val Ala Asp Met Val Pro Asn
995 1000 1005

Ile Phe Gly Leu Ala Val Gly Gly Met Val Phe Gly Gly Met Leu
1010 1015 1020

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Ala	Lys	Ala	Thr	Ser	Leu	Ser	Val	Ser	Glu	Asn	Tyr	Arg	Arg	Arg
1040						1045					1050			
Gln	Gln	Glu	Trp	Glu	Leu	Gln	Tyr	Lys	Gln	Ala	Asp	Ile	Asn	Ile
1055						1060					1065			
Glu	Glu	Ile	Asp	Ala	Gln	Ile	Gly	Ile	Gln	Gln	Arg	Gln	Leu	Asn
1070						1075					1080			
Ile	Ser	Thr	Thr	Gln	Leu	Ala	Gln	Leu	Glu	Ala	Gln	His	Glu	Gln
1085						1090					1095			
Asp	Gln	Val	Leu	Leu	Glu	Tyr	Tyr	Ser	Asn	Arg	Phe	Thr	Asn	Asp
1100						1105					1110			
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Ser	Trp	Gln	Tyr	Glu	Thr	Gly	Gln	Tyr	Asp	Met	Asn	Phe	Val	Gln
1145						1150					1155			
Ser	Gly	Leu	Trp	Asn	Asp	Leu	Tyr	Gln	Gly	Leu	Leu	Val	Gly	Glu
1160						1165					1170			
His	Leu	Lys	Leu	Ala	Leu	Gln	Arg	Met	Asp	Gln	Ala	Tyr	Leu	Gln
1175						1180					1185			
His	Asn	Thr	Arg	Arg	Leu	Glu	Ile	Ile	Lys	Thr	Ile	Ser	Val	Lys
1190						1195					1200			
Ser	Leu	Leu	Thr	Ser	Ser	Gln	Trp	Glu	Ile	Gly	Lys	Ser	Thr	Gly
1205						1210					1215			
Ser	Phe	Thr	Phe	Leu	Leu	Ser	Ala	Glu	Met	Phe	Leu	Arg	Asp	Tyr
1220						1225					1230			

Pro Thr His Ala Asp Arg Arg Ile Lys Thr Val Ala Leu Ser Leu
1235 1240 1245

Pro Ala Leu Leu Gly Pro Tyr Glu Asp Val Arg Ala Ser Leu Val
1250 1255 1260

Gln Leu Ser Asn Thr Leu Tyr Ser Thr Ala Asp Leu Lys Thr Ile
1265 1270 1275

Asp Tyr Leu Leu Asn Pro Leu Glu Tyr Thr Lys Pro Glu Asn Val
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Leu Leu Asn Val Gln Ala Asn Gln Gly Val Val Ile Ser Thr Ala
1295 1300 1305

Met Glu Asp Ser Gly Met Phe Arg Leu Asn Phe Asp Asp Glu Leu
1310 1315 1320

Phe Leu Pro Phe Glu Gly Thr Gly Ala Ile Ser Gln Trp Lys Leu
1325 1330 1335

Glu Phe Gly Ser Asp Gln Asp Gln Leu Leu Glu Ser Leu Ser Asp
1340 1345 1350

Ile Ile Leu His Leu Arg Tyr Thr Ala Arg Asp Val Ser Gly Gly
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Gln Leu Lys Gln Asp Asn Ser Asn
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<210> 11

<211> 1944

<212> DNA

<213> Xenorhabdus nematophilus

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Pro Glu Glu Ile Ala Asp His Gly Asn Pro Asn Thr Pro Asp Val Pro
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Pro Gly Glu Lys Thr Glu Val Leu Gln Tyr Asp Ala Leu Thr Glu Glu
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Thr Tyr Gln Lys Val Gly Tyr Lys Pro Asp Gly Ser Gly Thr Pro Leu
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Ser Tyr Ser Ser Ala Arg Val Ala Lys Ser Leu Tyr Asn Glu Tyr Glu
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Val Asp Pro Glu Asn Thr Glu Pro Leu Pro Lys Val Ser Ala Tyr Ile
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Asn Thr Ala Leu Thr Ser Asp Asp Ala Pro Gly Arg Gly Phe Asp Leu
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Glu Lys Ile Pro Pro Thr Ala Tyr Asp Arg Leu Ile Phe Ser Phe Met
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Ala Val Asn Gly Asp Lys Gly Lys Leu Ser Glu Arg Ile Asn Glu Val
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Val Asp Gly Trp Asn Arg Gln Ala Glu Ala Ser Ser Gly Gln Ile Ala
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Pro Ile Thr Leu Gly His Ile Val Pro Val Asp Pro Tyr Gly Asp Leu
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Gly Thr Thr Arg Asn Val Gly Leu Asp Ala Asp Gln Arg Arg Asp Ala
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Ser Pro Lys Asn Phe Leu Gln Tyr Tyr Asn Gln Asp Ala Ala Ser Gly
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Leu Leu Gly Gly Leu Arg Asn Leu Lys Ala Arg Ala Lys Gln Ala Gly
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His Lys Leu Glu Leu Ala Phe Ser Ile Gly Gly Trp Ser Met Ser Gly
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Tyr Phe Ser Val Met Ala Lys Asp Pro Glu Gln Arg Ala Thr Phe Val
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Ser Ser Ile Val Asp Phe Phe Arg Arg Phe Pro Met Phe Thr Ala Val
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Asp Ile Asp Trp Glu Tyr Pro Gly Ala Thr Gly Glu Glu Gly Asn Glu
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Phe Asp Pro Glu His Asp Gly Pro Asn Tyr Val Leu Leu Val Lys Glu
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Ile Thr Ile Ala Cys Ser Ala Val Val Ala Lys Met Glu Lys Ser Ser
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Asp Phe Phe Gly Thr Gly Trp Ala Glu Tyr Ile Gly His His Thr Asn
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Asn Tyr Gly Arg Ser Cys Leu Gly Ala Asp Leu Thr Thr Arg Arg Tyr
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Pro Arg Thr Val Leu His Lys Gly Ile Tyr Ala Thr Lys Met Lys Leu
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Asn Ala Ala His Glu Gly Leu Gly Tyr Leu Pro Val Arg Gly Lys Glu
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Tyr Gly Arg Ala His Arg Phe Val Lys Pro Gly Ser Ile Ala Ser Ile
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Glu Lys Thr Asp Tyr Asn Gly Val Met Lys Met Leu Ser Thr Tyr Arg
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Gln Thr Gly Met Thr Pro Tyr His Leu Pro Tyr Glu Ser Ala Arg Gln
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Lys Asn Phe Val Pro Ile Ala Asn Thr His Tyr Ser Ile Pro Ile Lys
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Leu Thr Thr Glu Gln Ile Thr Asn Gly Ile Thr Leu Arg Leu Trp Arg
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Val Lys Pro Asn Pro Ser Asp Ala Ile Asn Ala Asn Ala Tyr Phe Lys
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740

745

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Gln Ser Glu Thr Thr Ala Leu Gln His Asp Leu Pro Thr Leu Gln Ala
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 965 970 975

Ala Ile Ala Ser Ile Gln Leu Tyr Val Asn Arg Ala Leu Asn Asn Val
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Glu Gly Lys Val Ser Lys Pro Val Lys Thr Arg Gln Phe Phe Cys Asp
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Glu Leu Ala Tyr Tyr Pro Glu Asn Tyr Ile Asp Pro Thr Ile Arg
 1025 1030 1035

Ile Gly Gln Thr Gly Met Met Asn Asn Leu Leu Gln Gln Leu Ser
 1040 1045 1050

Gln Ser Gln Leu Asn Ile Asp Thr Val Glu Asp Ser Phe Lys Asn
 1055 1060 1065

Tyr Leu Thr Ala Phe Glu Asp Val Ala Asn Leu Gln Val Ile Ser
 1070 1075 1080

Gly Tyr His Asp Ser Ile Asn Val Asn Glu Gly Leu Thr Tyr Leu
 1085 1090 1095

Ile Gly Tyr Ser Gln Thr Glu Pro Arg Ile Tyr Tyr Trp Arg Asn
 1100 1105 1110

Val Asp His Gln Lys Cys Gln His Gly Gln Phe Ala Ala Asn Ala
 1115 1120 1125

Trp Gly Glu Trp Lys Lys Ile Glu Ile Pro Ile Asn Val Trp Gln
 1130 1135 1140

Glu Asn Ile Arg Pro Val Ile Tyr Lys Ser Arg Leu Tyr Leu Leu
 1145 1150 1155

Trp Leu Glu Gln Lys Glu Leu Lys Asn Glu Ser Glu Asp Gly Lys
 1160 1165 1170

Ile Asp Ile Thr Asp Tyr Ile Leu Lys Leu Ser His Ile Arg Tyr
 1175 1180 1185

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Arg Val	Leu Met His Leu Arg	Thr Lys Glu Lys Ile	Pro Arg Lys
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Ser Glu	Ile Gly Val Gly Ile	Asn Tyr Asp Tyr Glu	Ser Asn Asp
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Ala Glu	Phe Lys Leu Asp Thr	Asn Ile Val Leu Asp	Trp Lys Asp
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Asn Thr	Gly Val Trp His Thr	Ile Cys Glu Ser Phe	Thr Asn Asp
1445	1450	1455	
Val Ser	Ile Ile Asn Asn Met	Gly Asn Ile Ala Ala	Leu Phe Leu
1460	1465	1470	
Arg Glu	Asp Pro Cys Val Tyr	Leu Cys Ser Ile Ala	Thr Asp Ile
1475	1480	1485	
Lys Ile	Ala Ser Ser Met Ile	Glu Gln Ile Gln Asp	Lys Asn Ile
1490	1495	1500	
Ser Phe	Leu Leu Lys Asn Gly	Ser Asp Ile Leu Val	Glu Leu Asn
1505	1510	1515	
Ala Glu	Asp His Val Ala Ser	Lys Pro Ser His Glu	Ser Asp Pro
1520	1525	1530	
Met Val	Tyr Asp Phe Asn Gln	Val Lys Val Asp Ile	Glu Gly Tyr
1535	1540	1545	
Asp Ile	Pro Leu Val Ser Glu	Phe Ile Ile Lys Gln	Pro Asp Gly
1550	1555	1560	
Gly Tyr	Asn Asp Ile Val Ile	Glu Ser Pro Ile His	Ile Lys Leu
1565	1570	1575	
Lys Ser	Lys Asp Thr Ser Asn	Val Ile Ser Leu His	Lys Met Pro
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Ser Gly	Thr Gln Tyr Met Gln	Ile Gly Pro Tyr Arg	Thr Arg Leu
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Asn Thr	Leu Phe Ser Arg Lys	Leu Ala Glu Arg Ala	Asn Ile Gly

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Ile Asp Asn Val Leu Ser Met	Glu Thr Gln Asn Leu	Pro Glu Pro		
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Gln Leu Gly Glu Gly Phe Tyr	Ala Thr Phe Lys Leu	Pro Pro Tyr		
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Asn Lys Glu Glu His Gly Asp	Glu Arg Trp Phe Lys	Ile His Ile		
1655	1660	1665		
Gly Asn Ile Asp Gly Asn Ser	Ala Arg Gln Pro Tyr	Tyr Glu Gly		
1670	1675	1680		
Met Leu Ser Asp Ile Glu Thr	Thr Val Thr Leu Phe	Val Pro Tyr		
1685	1690	1695		
Ala Lys Gly Tyr Tyr Ile Arg	Glu Gly Val Arg Leu	Gly Val Gly		
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Tyr Lys Lys Ile Ile Tyr Asp	Lys Ser Trp Glu Ser	Ala Phe Phe		
1715	1720	1725		
Tyr Phe Asp Glu Thr Lys Asn	Gln Phe Ile Phe Ile	Asn Asp Ala		
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Asp His Asp Ser Gly Met Thr	Gln Gln Gly Ile Val	Lys Asn Ile		
1745	1750	1755		
Lys Lys Tyr Lys Gly Phe Ile	His Val Val Val Met	Lys Asn Asn		
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Thr Glu Pro Met Asp Phe Asn	Gly Ala Asn Ala Ile	Tyr Phe Trp		
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Glu Leu Phe Tyr Tyr Thr Pro	Met Met Val Phe Gln	Arg Leu Leu		
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Gln Glu Gln Asn Phe Thr Glu	Ser Thr Arg Trp Leu	Arg Tyr Ile		
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Trp Asn Pro Ala Gly Tyr Ser	Val Gln Gly Glu Met	Gln Asp Tyr		
1820	1825	1830		

Tyr	Trp	Asn	Val	Arg	Pro	Leu	Glu	Glu	Asp	Thr	Ser	Trp	Asn	Ala
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Pro	Met	His	Tyr	Lys	Val	Ala	Thr	Phe	Met	Lys	Met	Leu	Asp	Leu
1865						1870					1875			
Leu	Ile	Thr	Arg	Gly	Asp	Ser	Ala	Tyr	Arg	Gln	Leu	Glu	Arg	Asp
1880						1885					1890			
Thr	Leu	Asn	Glu	Ala	Lys	Met	Trp	Tyr	Val	Gln	Ala	Leu	Thr	Leu
1895						1900					1905			
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1910						1915					1920			
Pro	Arg	Leu	Glu	Glu	Ala	Ala	Ser	Gln	Thr	Met	Arg	His	His	Tyr
1925						1930					1935			
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1940						1945					1950			
Lys	Arg	Thr	Ala	Asn	Ser	Leu	Thr	Ala	Leu	Phe	Leu	Pro	Gln	Ile
1955						1960					1965			
Asn	Lys	Lys	Leu	Gln	Gly	Tyr	Trp	Gln	Thr	Leu	Thr	Gln	Arg	Leu
1970						1975					1980			
Tyr	Asn	Leu	Arg	His	Asn	Leu	Thr	Ile	Asp	Gly	Gln	Pro	Leu	Ser
1985						1990					1995			
Leu	Ser	Leu	Tyr	Ala	Thr	Pro	Ala	Asp	Pro	Ser	Met	Leu	Leu	Ser
2000						2005					2010			
Ala	Ala	Ile	Thr	Ala	Ser	Gln	Gly	Gly	Gly	Asp	Leu	Pro	His	Ala
2015						2020					2025			
Val	Met	Pro	Met	Tyr	Arg	Phe	Pro	Val	Ile	Leu	Glu	Asn	Ala	Lys
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Trp Gly	Val Ser Gln Leu	Ile	Gln Phe Gly Asn Thr	Leu Leu Ser
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Thr Gln	Gly Ser Glu Leu Ala	Leu Gln Ser Ile Lys	Met Gln Asp	
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Lys Val	Met Ala Glu Ile Asp	Ala Asp Lys Leu Ala	Leu Gln Glu	
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Tyr Leu	Ser Ser Ser Val Leu	Ser Thr Ser Gly Thr	Ala Leu His	
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Met Ala	Ala Ala Ala Ala Asp	Leu Val Pro Asn Ile	Tyr Gly Phe	
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Ala Val	Gly Gly Ser Arg Phe	Gly Ala Leu Phe Asn	Ala Ser Ala	
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Ile Gly	Ile Glu Ile Ser Ala	Ser Ala Thr Arg Ile	Ala Ala Asp	
2180		2185		2190
Lys Ile	Ser Gln Ser Glu Ile	Tyr Arg Arg Arg Arg	Gln Glu Trp	
2195		2200		2205
Glu Ile	Gln Arg Asn Asn Ala	Glu Ala Glu Ile Lys	Gln Ile Asp	
2210		2215		2220
Ala Gln	Leu Ala Thr Leu Ala	Val Arg Arg Glu Ala	Ala Val Leu	
2225		2230		2235
Gln Lys	Asn Tyr Leu Glu Thr	Gln Gln Ala Gln Thr	Gln Ala Gln	
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2285						2290					2295			
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2315						2320					2325			
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2435						2440					2445			
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Thr Pro Gln Val Thr Asp Glu Arg Ile Thr Gly Tyr Gln Tyr Asp Ala
 35 40 45

Gln Gly Ser Leu Thr Gln Ser Ile Asp Pro Arg Phe Tyr Glu Arg Gln
 50 55 60

Gln Thr Ala Ser Asp Lys Asn Ala Ile Thr Pro Asn Leu Ile Leu Leu
 65 70 75 80

Ser Ser Leu Ser Lys Lys Ala Leu Arg Thr Gln Ser Val Asp Ala Gly
 85 90 95

Thr Arg Val Ala Leu His Asp Val Ala Gly Arg Pro Val Leu Ala Val
 100 105 110

Ser Ala Asn Gly Val Ser Arg Thr Phe Gln Tyr Glu Ser Asp Asn Leu
 115 120 125

Pro Gly Arg Leu Leu Thr Ile Thr Glu Gln Val Lys Gly Glu Asn Ala
 130 135 140

Cys Ile Thr Glu Arg Leu Ile Trp Ser Gly Asn Thr Pro Ala Glu Lys
 145 150 155 160

Gly Asn Asn Leu Ala Gly Gln Cys Val Val His Tyr Asp Pro Thr Gly
 165 170 175

Met Asn Gln Thr Asn Ser Ile Ser Leu Thr Ser Ile Pro Leu Ser Ile
 180 185 190

Thr Gln Gln Leu Leu Lys Asp Asp Ser Glu Ala Asp Trp His Gly Met
 195 200 205

Asp Glu Ser Gly Trp Lys Asn Ala Leu Ala Pro Glu Ser Phe Thr Ser
 210 215 220

Val Ser Thr Thr Asp Ala Thr Gly Thr Val Leu Thr Ser Thr Asp Ala
 225 230 235 240

Ala Gly Asn Lys Gln Arg Ile Ala Tyr Asp Val Ala Gly Leu Leu Gln
 245 250 255

Gly Ser Trp Leu Ala Leu Lys Gly Lys Gln Glu Gln Val Ile Val Lys
 260 265 270

Ser Leu Thr Tyr Ser Ala Ala Ser Gln Lys Leu Arg Glu Glu His Gly
 275 280 285

Asn Gly Ile Val Thr Thr Tyr Thr Tyr Glu Pro Glu Thr Gln Arg Val
 290 295 300

Ile Gly Ile Lys Thr Glu Arg Pro Ser Gly His Ala Ala Gly Glu Lys
 305 310 315 320

Ile Leu Gln Asn Leu Arg Tyr Glu Tyr Asp Pro Val Gly Asn Val Leu
 325 330 335

Lys Ser Thr Asn Asp Ala Glu Ile Thr Arg Phe Trp Arg Asn Gln Lys
 340 345 350

Ile Val Pro Glu Asn Thr Tyr Thr Tyr Asp Ser Leu Tyr Gln Leu Val
 355 360 365

Ser Val Thr Gly Arg Glu Met Ala Asn Ile Gly Arg Gln Lys Asn Gln
 370 375 380

Leu Pro Ile Pro Ala Leu Ile Asp Asn Asn Thr Tyr Thr Asn Tyr Ser

385 390 395 400
 Arg Thr Tyr Asp Tyr Asp Arg Gly Gly Asn Leu Thr Arg Ile Arg His
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 Asn Ser Pro Ile Thr Gly Asn Asn Tyr Thr Thr Asn Met Thr Val Ser
 420 425 430
 Asp His Ser Asn Arg Ala Val Leu Glu Glu Leu Ala Gln Asp Pro Thr
 435 440 445
 Gln Val Asp Met Leu Phe Thr Pro Gly Gly His Gln Thr Arg Leu Val
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 Pro Gly Gln Asp Leu Phe Trp Thr Pro Arg Asp Glu Leu Gln Gln Val
 465 470 475 480
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 485 490 495
 Tyr Asp Ala Asp Ser Gln Arg Val Ile Lys Thr His Ile Gln Lys Thr
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 Gly Asn Ser Glu Gln Ile Gln Arg Thr Leu Tyr Leu Pro Glu Leu Glu
 515 520 525
 Trp Arg Thr Thr Tyr Ser Gly Asn Thr Leu Lys Glu Phe Leu Gln Val
 530 535 540
 Ile Thr Val Gly Glu Ser Gly Gln Ala Gln Val Arg Val Leu His Trp
 545 550 555 560
 Glu Thr Gly Lys Pro Ala Asp Ile Ser Asn Asp Gln Leu Arg Tyr Ser
 565 570 575
 Tyr Gly Asn Leu Ile Gly Ser Ser Gly Leu Glu Leu Asp Ser Asp Gly
 580 585 590
 Gln Ile Ile Ser Gln Glu Glu Tyr Tyr Pro Tyr Gly Gly Thr Ala Val
 595 600 605
 Trp Ala Ala Arg Ser Gln Ser Glu Ala Asp Tyr Lys Thr Val Arg Tyr
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Ser Gly Lys Glu Arg Asp Ala Thr Gly Leu Tyr Tyr Tyr Gly Tyr Arg
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Tyr Tyr Gln Ser Trp Thr Gly Arg Trp Leu Ser Val Asp Pro Ala Gly
645 650 655

Glu Val Asp Gly Leu Asn Leu Phe Arg Met Cys Arg Asn Asn Pro Ile
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Val Phe Ser Asp Ser Asp Gly Arg Phe Pro Gly Gln Gly Val Leu Ala
675 680 685

Trp Ile Gly Lys Lys Ala Tyr Arg Lys Ala Val Asn Ile Thr Thr Glu
690 695 700

His Leu Leu Glu Gln Gly Ala Ser Phe Asp Thr Phe Leu Lys Leu Asn
705 710 715 720

Arg Gly Leu Arg Thr Phe Val Leu Gly Val Gly Val Ala Ser Leu Gly
725 730 735

Val Lys Ala Ala Thr Ile Ala Gly Ala Ser Pro Trp Gly Ile Val Gly
740 745 750

Ala Ala Ile Gly Gly Phe Val Ser Gly Ala Val Met Gly Phe Phe Ala
755 760 765

Asn Asn Ile Ser Glu Lys Ile Gly Glu Val Leu Ser Tyr Leu Thr Arg
770 775 780

Lys Arg Ser Val Pro Val Gln Val Gly Ala Phe Val Val Thr Ser Leu
785 790 795 800

Val Thr Ser Ala Leu Phe Asn Ser Ser Ser Thr Gly Thr Ala Ile Ser
805 810 815

Ala Ala Thr Ala Val Thr Val Gly Gly Leu Met Ala Leu Ala Gly Glu
820 825 830

His Asn Thr Gly Met Ala Ile Ser Ile Ala Thr Pro Ala Gly Gln Gly
835 840 845

Thr Leu Asp Thr Leu Arg Pro Gly Asn Val Ser Ala Pro Glu Arg Leu
850 855 860

Gly Ala Leu Ser Gly Ala Ile Ile Gly Gly Ile Leu Leu Gly Arg His
865 870 875 880

Gln Gly Ser Ser Glu Leu Gly Glu Arg Ala Ala Ile Gly Ala Met Tyr
885 890 895

Gly Ala Arg Trp Gly Arg Ile Ile Gly Asn Leu Trp Asp Gly Pro Tyr
900 905 910

Arg Phe Ile Gly Arg Leu Leu Leu Arg Arg Gly Ile Ser Ser Ala Ile
915 920 925

Ser His Ala Val Ser Ser Arg Ser Trp Phe Gly Arg Met Ile Gly Glu
930 935 940

Ser Val Gly Arg Asn Ile Ser Glu Val Leu Leu Pro Tyr Ser Arg Thr
945 950 955 960

Pro Gly Glu Trp Val Gly Ala Ala Ile Gly Gly Thr Ala Ala Ala Ala
965 970 975

His His Ala Val Gly Gly Glu Val Ala Asn Ala Ala Ser Arg Val Thr
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Ala Glu Gly Gly Ala Ser Phe Ser Leu Pro Leu Pro Ile Ser Val Gly
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Arg Gly Leu Val Pro Val Leu Ser Leu Asn Tyr Ser Ser Thr Ala Gly
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Gln Pro His Thr Val Thr Arg Tyr Gln Ser Arg Val Ala Glu Lys Ile
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Lys His His His Ala Arg Ile Ala Asp Pro Gln Asp Glu Thr Arg Ile
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Gln His Trp Arg Leu Asp Met Thr Ile Phe Lys Pro Trp Leu Leu Asn		
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 35 40 45

Leu Tyr His Glu Thr Ile Glu Gln Lys Lys Asn Asn Arg Leu Leu Glu
 50 55 60

Ala Arg Ile Phe Thr Arg Ala Asn Pro Gln Leu Ser Gly Ala Ile Arg
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Leu Gly Ile Glu Arg Asp Ser Val Ser Arg Ser Tyr Asp Glu Met Phe
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Gly Ala Arg Ser Ser Ser Phe Val Lys Pro Gly Ser Val Ala Ser Met
 100 105 110

Phe Ser Pro Ala Gly Tyr Leu Thr Glu Leu Tyr Arg Glu Ala Lys Asp
 115 120 125

Leu His Phe Ser Ser Ser Ala Tyr His Leu Asp Asn Arg Arg Pro Asp
 130 135 140

Leu Ala Asp Leu Thr Leu Ser Gln Ser Asn Met Asp Thr Glu Ile Ser
 145 150 155 160

Thr Leu Thr Leu Ser Asn Glu Leu Leu Leu Glu His Ile Thr Arg Lys
 165 170 175

Thr Gly Gly Asp Ser Asp Ala Leu Met Glu Ser Leu Ser Thr Tyr Arg
 180 185 190

Gln Ala Ile Asp Thr Pro Tyr His Gln Pro Tyr Glu Thr Ile Arg Gln
 195 200 205

Val Ile Met Thr His Asp Ser Thr Leu Ser Ala Leu Ser Arg Asn Pro
 210 215 220

Glu Val Met Gly Gln Ala Glu Gly Ala Ser Leu Leu Ala Ile Leu Ala
 225 230 235 240

Asn Ile Ser Pro Glu Leu Tyr Asn Ile Leu Thr Glu Glu Ile Thr Glu
 245 250 255

Lys Asn Ala Asp Ala Leu Phe Ala Gln Asn Phe Ser Glu Asn Ile Thr
 260 265 270

Pro Glu Asn Phe Ala Ser Gln Ser Trp Ile Ala Lys Tyr Tyr Gly Leu
 275 280 285

Glu Leu Ser Glu Val Gln Lys Tyr Leu Gly Met Leu Gln Asn Gly Tyr
 290 295 300

Ser Asp Ser Thr Ser Ala Tyr Val Asp Asn Ile Ser Thr Gly Leu Val
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Val Asn Asn Glu Ser Lys Leu Glu Ala Tyr Lys Ile Thr Arg Val Lys
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Thr Asp Asp Tyr Asp Lys Asn Ile Asn Tyr Phe Asp Leu Met Tyr Glu
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Gly Asn Asn Gln Phe Phe Ile Arg Ala Asn Phe Lys Val Ser Arg Glu
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Phe Gly Ala Thr Leu Arg Lys Asn Ala Gly Pro Ser Gly Ile Val Gly
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Leu Ser Asn Ile Ser Asp Ser Glu Tyr Lys Asn Gly Val Lys Ile Tyr
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Ala Tyr Arg Tyr Thr Ser Ser Thr Ser Ala Thr Asn Gln Gly Gly Gly
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Ile Phe Thr Phe Glu Ser Tyr Pro Leu Thr Ile Phe Ala Leu Lys Leu
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Asn Lys Ala Ile Arg Leu Cys Leu Thr Ser Gly Leu Ser Pro Asn Glu
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Leu Gln Thr Ile Val Arg Ser Asp Asn Ala Gln Gly Ile Ile Asn Asp
 465 470 475 480

Ser Val Leu Thr Lys Val Phe Tyr Thr Leu Phe Tyr Ser His Arg Tyr
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Ala Leu Ser Phe Asp Asp Ala Gln Val Leu Asn Gly Ser Val Ile Asn
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Gln Tyr Ala Asp Asp Asp Ser Val Ser His Phe Asn Arg Leu Phe Asn
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Thr Pro Pro Leu Lys Gly Lys Ile Phe Glu Ala Asp Gly Asn Thr Val
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Met Arg Gly Leu Gly Val Asn Ser Gly Glu Leu Tyr Gln Leu Gly Lys
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Leu Ala Gly Val Leu Asp Ala Gln Asn Thr Ile Thr Leu Ser Val Phe
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Val Ile Ser Ser Leu Tyr Arg Leu Thr Leu Leu Ala Arg Val His Gln
 595 600 605

Leu Thr Val Asn Glu Leu Cys Met Leu Tyr Gly Leu Ser Pro Phe Asn
 610 615 620

Gly Lys Thr Thr Ala Ser Leu Ser Ser Gly Glu Leu Pro Arg Leu Val
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Ile Trp Leu Tyr Gln Val Thr Gln Trp Leu Thr Glu Ala Glu Ile Thr
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Thr Glu Ala Ile Trp Leu Leu Cys Thr Pro Glu Phe Ser Gly Asn Ile

660

665

670

Ser Pro Glu Ile Ser Asn Leu Leu Asn Asn Leu Arg Pro Ser Ile Ser
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Glu Asp Met Ala Gln Ser His Asn Arg Glu Leu Gln Ala Glu Ile Leu
 690 695 700

Ala Pro Phe Ile Ala Ala Thr Leu His Leu Ala Ser Pro Asp Met Ala
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Arg Tyr Ile Leu Leu Trp Thr Asp Asn Leu Arg Pro Gly Gly Leu Asp
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Ile Ala Gly Phe Met Thr Leu Val Leu Lys Glu Ser Leu Asn Ala Asn
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Glu Thr Thr Gln Leu Val Gln Phe Cys His Val Met Ala Gln Leu Ser
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Leu Ser Val Gln Thr Leu Arg Leu Ser Glu Ala Glu Leu Ser Val Leu
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Val Ile Ser Gly Phe Ala Val Leu Gly Ala Lys Asn Gln Pro Ala Gly
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Gln His Asn Ile Asp Thr Leu Phe Ser Leu Tyr Arg Phe His Gln Trp
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Gln Gln Thr Leu Thr Ala Asp Arg Leu Ala Ser Val Met Gly Leu Asp
 835 840 845

Ile Ser Met Val Thr Gln Ala Met Val Ser Ala Gly Val Asn Gln Leu
 850 855 860

Gln Cys Trp Gln Asp Ile Asn Thr Val Leu Gln Trp Ile Asp Val Ala
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Ser Ala Leu His Thr Met Pro Ser Val Ile Arg Thr Leu Val Asn Ile
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Arg Tyr Val Thr Ala Leu Asn Lys Ala Glu Ser Asn Leu Pro Ser Trp
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Asp Glu Trp Gln Thr Leu Ala Glu Asn Met Glu Ala Gly Leu Ser Thr
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Gln Gln Ala Gln Thr Leu Ala Asp Tyr Thr Ala Glu Arg Leu Ser Ser
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Val Leu Cys Asn Trp Phe Leu Ala Asn Ile Gln Pro Glu Gly Val Ser
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Leu His Ser Arg Asp Asp Leu Tyr Ser Tyr Phe Leu Ile Asp Asn Gln
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Val Ser Ser Ala Ile Lys Thr Thr Arg Leu Ala Glu Ala Ile Ala Gly
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Ile Gln Leu Tyr Ile Asn Arg Ala Leu Asn Arg Ile Glu Pro Asn Ala
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Arg Ala Asp Val Ser Thr Arg Gln Phe Phe Thr Asp Trp Thr Val
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Asn Asn Arg Tyr Ser Thr Trp Gly Gly Val Ser Arg Leu Val Tyr
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Tyr Pro Glu Asn Tyr Ile Asp Pro Thr Gln Arg Ile Gly Gln Thr
 1040 1045 1050

Arg Met Met Asp Glu Leu Leu Glu Asn Ile Ser Gln Ser Lys Leu
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Ser Arg Asp Thr Val Glu Asp Ala Phe Lys Thr Tyr Leu Thr Arg
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Phe Glu Thr Val Ala Asp Leu Lys Val Val Ser Ala Tyr His Asp
 1085 1090 1095

Asn Val Asn Ser Asn Thr Gly Leu Thr Trp Phe Val Gly Gln Thr
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Pro Val	Ile Phe	Arg Glu	Arg Leu	His Leu	Ile Trp	Val Glu	Lys
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Glu Glu	Val Ala	Lys Asn	Gly Thr	Asp Pro	Val Glu	Thr Tyr	Asp
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Arg Phe	Thr Leu	Lys Leu	Ala Phe	Leu Arg	His Asp	Gly Ser	Trp
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Ser Ala	Pro Trp	Ser Tyr	Asp Ile	Thr Thr	Gln Val	Glu Ala	Val
1205			1210		1215		
Thr Asp	Lys Lys	Pro Asp	Thr Glu	Arg Leu	Ala Leu	Ala Ala	Ser
1220			1225		1230		
Gly Phe	Gln Gly	Glu Asp	Thr Leu	Leu Val	Phe Val	Tyr Lys	Thr
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Gly Lys	Ser Tyr	Ser Asp	Phe Gly	Gly Ser	Asn Lys	Asn Val	Ala
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Gly Met	Thr Ile	Tyr Gly	Asp Gly	Ser Phe	Lys Lys	Met Glu	Asn
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Thr Ala	Leu Ser	Arg Tyr	Ser Gln	Leu Lys	Asn Thr	Phe Asp	Ile
1280			1285		1290		
Ile His	Thr Gln	Gly Asn	Asp Leu	Val Arg	Lys Ala	Ser Tyr	Arg
1295			1300		1305		
Phe Ala	Gln Asp	Phe Glu	Val Pro	Ala Ser	Leu Asn	Met Gly	Ser
1310			1315		1320		

Ala Ile	Gly Asp Asp Ser Leu	Thr Val Met Glu Asn	Gly Asn Ile
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Pro Gln	Ile Thr Ser Lys Tyr	Ser Ser Asp Asn Leu	Ala Ile Thr
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Leu His	Asn Ala Ala Phe Thr	Val Arg Tyr Asp Gly	Ser Gly Asn
1355	1360	1365	
Val Ile	Arg Asn Lys Gln Ile	Ser Ala Met Lys Leu	Thr Gly Val
1370	1375	1380	
Asp Gly	Lys Ser Gln Tyr Gly	Asn Ala Phe Ile Ile	Ala Asn Thr
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Val Lys	His Tyr Gly Gly Tyr	Ser Asp Leu Gly Gly	Pro Ile Thr
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Val Tyr	Asn Lys Thr Lys Asn	Tyr Ile Ala Ser Val	Gln Gly His
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Leu Met	Asn Ala Asp Tyr Thr	Arg Arg Leu Ile Leu	Thr Pro Val
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Glu Asn	Asn Tyr Tyr Ala Arg	Leu Phe Glu Phe Pro	Phe Ser Pro
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Asn Thr	Ile Leu Asn Thr Val	Phe Thr Val Gly Ser	Asn Lys Thr
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Ser Asp	Phe Lys Lys Cys Ser	Tyr Ala Val Asp Gly	Asn Asn Ser
1475	1480	1485	
Gln Gly	Phe Gln Ile Phe Ser	Ser Tyr Gln Ser Ser	Gly Trp Leu
1490	1495	1500	
Asp Ile	Asp Thr Gly Ile Asn	Asn Thr Asp Ile Lys	Ile Thr Val
1505	1510	1515	
Met Ala	Gly Ser Lys Thr His	Thr Phe Thr Ala Ser	Asp His Ile
1520	1525	1530	
Ala Ser	Leu Pro Ala Asn Ser	Phe Asp Ala Met Pro	Tyr Thr Phe

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Lys Pro Leu Glu Ile Asp Ala Ser Ser Leu Ala Phe Thr Asn Asn				
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Ile Ala Pro Leu Asp Ile Val Phe Glu Thr Lys Ala Lys Asp Gly				
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Arg Val Leu Gly Lys Ile Lys Gln Thr Leu Ser Val Lys Arg Val				
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Asn Tyr Asn Pro Glu Asp Ile Leu Phe Leu Arg Glu Thr His Ser				
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Gly Ala Gln Tyr Met Gln Leu Gly Val Tyr Arg Ile Arg Leu Asn				
1610		1615		1620
Thr Leu Leu Ala Ser Gln Leu Val Ser Arg Ala Asn Thr Gly Ile				
1625		1630		1635
Asp Thr Ile Leu Thr Met Glu Thr Gln Arg Leu Pro Glu Pro Pro				
1640		1645		1650
Leu Gly Glu Gly Phe Phe Ala Asn Phe Val Leu Pro Lys Tyr Asp				
1655		1660		1665
Pro Ala Glu His Gly Asp Glu Arg Trp Phe Lys Ile His Ile Gly				
1670		1675		1680
Asn Val Gly Gly Asn Thr Gly Arg Gln Pro Tyr Tyr Ser Gly Met				
1685		1690		1695
Leu Ser Asp Thr Ser Glu Thr Ser Met Thr Leu Phe Val Pro Tyr				
1700		1705		1710
Ala Glu Gly Tyr Tyr Met His Glu Gly Val Arg Leu Gly Val Gly				
1715		1720		1725
Tyr Gln Lys Ile Thr Tyr Asp Asn Thr Trp Glu Ser Ala Phe Phe				
1730		1735		1740
Tyr Phe Asp Glu Thr Lys Gln Gln Phe Val Leu Ile Asn Asp Ala				
1745		1750		1755

Asp	His	Asp	Ser	Gly	Met	Thr	Gln	Gln	Gly	Ile	Val	Lys	Asn	Ile
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Lys	Lys	Tyr	Lys	Gly	Phe	Leu	Asn	Val	Ser	Ile	Ala	Thr	Gly	Tyr
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Ser	Ala	Pro	Met	Asp	Phe	Asn	Ser	Ala	Ser	Ala	Leu	Tyr	Tyr	Trp
1790						1795					1800			
Glu	Leu	Phe	Tyr	Tyr	Thr	Pro	Met	Met	Cys	Phe	Gln	Arg	Leu	Leu
1805						1810					1815			
Gln	Glu	Lys	Gln	Phe	Asp	Glu	Ala	Thr	Gln	Trp	Ile	Asn	Tyr	Val
1820						1825					1830			
Tyr	Asn	Pro	Ala	Gly	Tyr	Ile	Val	Asn	Gly	Glu	Ile	Ala	Pro	Trp
1835						1840					1845			
Ile	Trp	Asn	Cys	Arg	Pro	Leu	Glu	Glu	Thr	Thr	Ser	Trp	Asn	Ala
1850						1855					1860			
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1880						1885					1890			
Leu	Ile	Leu	Arg	Gly	Asp	Met	Ala	Tyr	Arg	Glu	Leu	Thr	Arg	Asp
1895						1900					1905			
Ala	Leu	Asn	Glu	Ala	Lys	Met	Trp	Tyr	Val	Arg	Thr	Leu	Glu	Leu
1910						1915					1920			
Leu	Gly	Asp	Glu	Pro	Glu	Asp	Tyr	Gly	Ser	Gln	Gln	Trp	Ala	Ala
1925						1930					1935			
Pro	Ser	Leu	Ser	Gly	Ala	Ala	Ser	Gln	Thr	Val	Gln	Ala	Ala	Tyr
1940						1945					1950			
Gln	Gln	Asp	Leu	Thr	Met	Leu	Gly	Arg	Gly	Gly	Val	Ser	Lys	Asn
1955						1960					1965			

Leu Arg 1970	Thr Ala Asn Ser 1975	Leu Val Gly Leu Phe 1980	Leu Pro Glu Tyr
Asn Pro 1985	Ala Leu Thr Asp Tyr 1990	Trp Gln Thr Leu Arg 1995	Leu Arg Leu
Phe Asn 2000	Leu Arg His Asn Leu 2005	Ser Ile Asp Gly Gln 2010	Pro Leu Ser
Leu Ala 2015	Ile Tyr Ala Glu Pro 2020	Thr Asp Pro Lys Ala 2025	Leu Leu Thr
Ser Met 2030	Val Gln Ala Ser Gln 2035	Gly Gly Ser Ala Val 2040	Leu Pro Gly
Thr Leu 2045	Ser Leu Tyr Arg Phe 2050	Pro Val Met Leu Glu 2055	Arg Thr Arg
Asn Leu 2060	Val Ala Gln Leu Thr 2065	Gln Phe Gly Thr Ser 2070	Leu Leu Ser
Met Ala 2075	Glu His Asp Asp Ala 2080	Asp Glu Leu Thr Thr 2085	Leu Leu Leu
Gln Gln 2090	Gly Met Glu Leu Ala 2095	Thr Gln Ser Ile Arg 2100	Ile Gln Gln
Arg Thr 2105	Val Asp Glu Val Asp 2110	Ala Asp Ile Ala Val 2115	Leu Ala Glu
Ser Arg 2120	Arg Ser Ala Gln Asn 2125	Arg Leu Glu Lys Tyr 2130	Gln Gln Leu
Tyr Asp 2135	Glu Asp Ile Asn His 2140	Gly Glu Gln Arg Ala 2145	Met Ser Leu
Leu Asp 2150	Ala Ala Ala Gly Gln 2155	Ser Leu Ala Gly Gln 2160	Val Leu Ser
Ile Ala 2165	Glu Gly Val Ala Asp 2170	Leu Val Pro Asn Val 2175	Phe Gly Leu

Ala Cys Gly Gly Ser Arg Trp Gly Ala Ala Leu Arg Ala Ser Ala
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Ser Val Met Ser Leu Ser Ala Thr Ala Ser Gln Tyr Ser Ala Asp
2195 2200 2205

Lys Ile Ser Arg Ser Glu Ala Tyr Arg Arg Arg Arg Gln Glu Trp
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2225 2230 2235

Ala Gln Leu Glu Ser Leu Lys Ile Arg Arg Glu Ala Ala Gln Met
2240 2245 2250

Gln Val Glu Tyr Gln Glu Thr Gln Gln Ala His Thr Gln Ala Gln
2255 2260 2265

Leu Glu Leu Leu Gln Arg Lys Phe Thr Asn Lys Ala Leu Tyr Ser
2270 2275 2280

Trp Met Arg Gly Lys Leu Ser Ala Ile Tyr Tyr Gln Phe Phe Asp
2285 2290 2295

Leu Thr Gln Ser Phe Cys Leu Met Ala Gln Glu Ala Leu Arg Arg
2300 2305 2310

Glu Leu Thr Asp Asn Gly Val Thr Phe Ile Arg Gly Gly Ala Trp
2315 2320 2325

Asn Gly Thr Thr Ala Gly Leu Met Ala Gly Glu Thr Leu Leu Leu
2330 2335 2340

Asn Leu Ala Glu Met Glu Lys Val Trp Leu Glu Arg Asp Glu Arg
2345 2350 2355

Ala Leu Glu Val Thr Arg Thr Val Ser Leu Ala Gln Phe Tyr Gln
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2375 2380 2385

Phe Leu Arg Glu Gly Lys Gly Asn Val Gly Ala Ser Gly Asn Glu

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Met	Asn	Glu	Ser	Val	Lys	Glu	Ile	Pro	Asp	Val	Leu	Lys	Ser	Gln	Cys	
1				5					10					15		
ggt	ttt	aat	tgt	ctg	aca	gat	att	agc	cac	agc	tct	ttt	aat	gaa	ttt	96
Gly	Phe	Asn	Cys	Leu	Thr	Asp	Ile	Ser	His	Ser	Ser	Phe	Asn	Glu	Phe	
				20				25					30			

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tat cat gat gca caa cag gca caa aag gat aat cgc ctg tat gaa gcg Tyr His Asp Ala Gln Gln Ala Gln Lys Asp Asn Arg Leu Tyr Glu Ala 50 55 60	192
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gcc att ctc gct ccc aat gct gaa ctg ata ggc tat aac aat caa ttt Ala Ile Leu Ala Pro Asn Ala Glu Leu Ile Gly Tyr Asn Asn Gln Phe 85 90 95	288
agc ggt aga gcc agt caa tat gtt gcg ccg ggt acc gtt tct tcc atg Ser Gly Arg Ala Ser Gln Tyr Val Ala Pro Gly Thr Val Ser Ser Met 100 105 110	336
ttc tcc ccc gcc gct tat ttg act gaa ctt tat cgt gaa gca cgc aat Phe Ser Pro Ala Ala Tyr Leu Thr Glu Leu Tyr Arg Glu Ala Arg Asn 115 120 125	384
tta cac gca agt gac tcc gtt tat tat ctg gat acc cgc cgc cca gat Leu His Ala Ser Asp Ser Val Tyr Tyr Leu Asp Thr Arg Arg Pro Asp 130 135 140	432
ctc aaa tca atg gcg ctc agt cag caa aat atg gat ata gaa tta tcc Leu Lys Ser Met Ala Leu Ser Gln Gln Asn Met Asp Ile Glu Leu Ser 145 150 155 160	480
aca ctc tct ttg tcc aat gag ctg tta ttg gaa agc att aaa act gaa Thr Leu Ser Leu Ser Asn Glu Leu Leu Leu Glu Ser Ile Lys Thr Glu 165 170 175	528
tct aaa ctg gaa aac tat act aaa gtg atg gaa atg ctc tcc act ttc Ser Lys Leu Glu Asn Tyr Thr Lys Val Met Glu Met Leu Ser Thr Phe 180 185 190	576
cgt cct tcc ggc gca acg cct tat cat gat gct tat gaa aat gtg cgt Arg Pro Ser Gly Ala Thr Pro Tyr His Asp Ala Tyr Glu Asn Val Arg 195 200 205	624
gaa gtt atc cag cta caa gat cct gga ctt gag caa ctc aat gca tca Glu Val Ile Gln Leu Gln Asp Pro Gly Leu Glu Gln Leu Asn Ala Ser 210 215 220	672
ccg gca att gcc ggg ttg atg cat caa gcc tcc cta ttg ggt att aac Pro Ala Ile Ala Gly Leu Met His Gln Ala Ser Leu Leu Gly Ile Asn 225 230 235 240	720
gct tca atc tcg cct gag cta ttt aat att ctg acg gag gag att acc Ala Ser Ile Ser Pro Glu Leu Phe Asn Ile Leu Thr Glu Glu Ile Thr 245 250 255	768

gaa ggt aat gct gag gaa ctt tat aag aaa aat ttt ggt aat atc gaa Glu Gly Asn Ala Glu Glu Leu Tyr Lys Lys Asn Phe Gly Asn Ile Glu 260 265 270	816
ccg gcc tca ttg gct atg ccg gaa tac ctt aaa cgt tat tat aat tta Pro Ala Ser Leu Ala Met Pro Glu Tyr Leu Lys Arg Tyr Tyr Asn Leu 275 280 285	864
agc gat gaa gaa ctt agt cag ttt att ggt aaa gcc agc aat ttt ggt Ser Asp Glu Glu Leu Ser Gln Phe Ile Gly Lys Ala Ser Asn Phe Gly 290 295 300	912
caa cag gaa tat agt aat aac caa ctt att act ccg gta gtc aac agc Gln Gln Glu Tyr Ser Asn Asn Gln Leu Ile Thr Pro Val Val Asn Ser 305 310 315 320	960
agt gat ggc acg gtt aag gta tat cgg atc acc cgc gaa tat aca acc Ser Asp Gly Thr Val Lys Val Tyr Arg Ile Thr Arg Glu Tyr Thr Thr 325 330 335	1008
aat gct tat caa atg gat gtg gag cta ttt ccc ttc ggt ggt gag aat Asn Ala Tyr Gln Met Asp Val Glu Leu Phe Pro Phe Gly Gly Glu Asn 340 345 350	1056
tat cgg tta gat tat aaa ttc aaa aat ttt tat aat gcc tct tat tta Tyr Arg Leu Asp Tyr Lys Phe Lys Asn Phe Tyr Asn Ala Ser Tyr Leu 355 360 365	1104
tcc atc aag tta aat gat aaa aga gaa ctt gtt cga act gaa ggc gct Ser Ile Lys Leu Asn Asp Lys Arg Glu Leu Val Arg Thr Glu Gly Ala 370 375 380	1152
cct caa gtc aat ata gaa tac tcc gca aat atc aca tta aat acc gct Pro Gln Val Asn Ile Glu Tyr Ser Ala Asn Ile Thr Leu Asn Thr Ala 385 390 395 400	1200
gat atc agt caa cct ttt gaa att ggc ctg aca cga gta ctt cct tcc Asp Ile Ser Gln Pro Phe Glu Ile Gly Leu Thr Arg Val Leu Pro Ser 405 410 415	1248
ggc tct tgg gca tat gcc gcc gca aaa ttt acc gtt gaa gag tat aac Gly Ser Trp Ala Tyr Ala Ala Ala Lys Phe Thr Val Glu Glu Tyr Asn 420 425 430	1296
caa tac tct ttt ctg cta aaa ctt aac aag gct att cgt cta tca cgt Gln Tyr Ser Phe Leu Leu Lys Leu Asn Lys Ala Ile Arg Leu Ser Arg 435 440 445	1344
gcg aca gaa ttg tca ccc acg att ctg gaa ggc att gtg cgc agt gtt Ala Thr Glu Leu Ser Pro Thr Ile Leu Glu Gly Ile Val Arg Ser Val 450 455 460	1392
aat cta caa ctg gat atc aac aca gac gta tta ggt aaa gtt ttt ctg Asn Leu Gln Leu Asp Ile Asn Thr Asp Val Leu Gly Lys Val Phe Leu 465 470 475 480	1440
act aaa tat tat atg cag cgt tat gct att cat gct gaa act gcc ctg	1488

Thr Lys Tyr Tyr Met Gln Arg Tyr Ala Ile His Ala Glu Thr Ala Leu	
485 490 495	
ata cta tgc aac gcg cct att tca caa cgt tca tat gat aat caa cct	1536
Ile Leu Cys Asn Ala Pro Ile Ser Gln Arg Ser Tyr Asp Asn Gln Pro	
500 505 510	
agc caa ttt gat cgc ctg ttt aat acg cca tta ctg aac gga caa tat	1584
Ser Gln Phe Asp Arg Leu Phe Asn Thr Pro Leu Leu Asn Gly Gln Tyr	
515 520 525	
ttt tct acc ggc gat gag gag att gat tta aat tca ggt agc acc ggc	1632
Phe Ser Thr Gly Asp Glu Glu Ile Asp Leu Asn Ser Gly Ser Thr Gly	
530 535 540	
gat tgg cga aaa acc ata ctt aag cgt gca ttt aat att gat gat gtc	1680
Asp Trp Arg Lys Thr Ile Leu Lys Arg Ala Phe Asn Ile Asp Asp Val	
545 550 555 560	
tcg ctc ttc cgc ctg ctt aaa att acc gac cat gat aat aaa gat gga	1728
Ser Leu Phe Arg Leu Leu Lys Ile Thr Asp His Asp Asn Lys Asp Gly	
565 570 575	
aaa att aaa aat aac cta aag aat ctt tcc aat tta tat att gga aaa	1776
Lys Ile Lys Asn Asn Leu Lys Asn Leu Ser Asn Leu Tyr Ile Gly Lys	
580 585 590	
tta ctg gca gat att cat caa tta acc att gat gaa ctg gat tta tta	1824
Leu Leu Ala Asp Ile His Gln Leu Thr Ile Asp Glu Leu Asp Leu Leu	
595 600 605	
ctg att gcc gta ggt gaa gga aaa act aat tta tcc gct atc agt gat	1872
Leu Ile Ala Val Gly Glu Gly Lys Thr Asn Leu Ser Ala Ile Ser Asp	
610 615 620	
aag caa ttg gct acc ctg atc aga aaa ctc aat act att acc agc tgg	1920
Lys Gln Leu Ala Thr Leu Ile Arg Lys Leu Asn Thr Ile Thr Ser Trp	
625 630 635 640	
cta cat aca cag aag tgg agt gta ttc cag cta ttt atc atg acc tcc	1968
Leu His Thr Gln Lys Trp Ser Val Phe Gln Leu Phe Ile Met Thr Ser	
645 650 655	
acc agc tat aac aaa acg cta acg cct gaa att aag aat ttg ctg gat	2016
Thr Ser Tyr Asn Lys Thr Leu Thr Pro Glu Ile Lys Asn Leu Leu Asp	
660 665 670	
acc gtc tac cac ggt tta caa ggt ttt gat aaa gac aaa gca gat ttg	2064
Thr Val Tyr His Gly Leu Gln Gly Phe Asp Lys Asp Lys Ala Asp Leu	
675 680 685	
cta cat gtc atg gcg ccc tat att gcg gcc acc ttg caa tta tca tcg	2112
Leu His Val Met Ala Pro Tyr Ile Ala Ala Thr Leu Gln Leu Ser Ser	
690 695 700	
gaa aat gtc gcc cac tcg gta ctc ctt tgg gca gat aag tta cag ccc	2160
Glu Asn Val Ala His Ser Val Leu Leu Trp Ala Asp Lys Leu Gln Pro	

705	710	715	720	
ggc gac ggc gca atg aca gca gaa aaa ttc tgg gac tgg ttg aat act				2208
Gly Asp Gly Ala Met Thr Ala Glu Lys Phe Trp Asp Trp Leu Asn Thr				
725		730	735	
aag tat acg ccg ggt tca tcg gaa gcc gta gaa acg cag gaa cat atc				2256
Lys Tyr Thr Pro Gly Ser Ser Glu Ala Val Glu Thr Gln Glu His Ile				
740		745	750	
gtt cag tat tgt cag gct ctg gca caa ttg gaa atg gtt tac cat tcc				2304
Val Gln Tyr Cys Gln Ala Leu Ala Gln Leu Glu Met Val Tyr His Ser				
755		760	765	
acc ggc atc aac gaa aac gcc ttc cgt cta ttt gtg aca aaa cca gag				2352
Thr Gly Ile Asn Glu Asn Ala Phe Arg Leu Phe Val Thr Lys Pro Glu				
770		775	780	
atg ttt ggc gct gca act gga gca gcg ccc gcg cat gat gcc ctt tca				2400
Met Phe Gly Ala Ala Thr Gly Ala Ala Pro Ala His Asp Ala Leu Ser				
785		790	795	800
ctg att atg ctg aca cgt ttt gcg gat tgg gtg aac gca cta ggc gaa				2448
Leu Ile Met Leu Thr Arg Phe Ala Asp Trp Val Asn Ala Leu Gly Glu				
805		810	815	
aaa gcg tcc tcg gtg cta gcg gca ttt gaa gct aac tcg tta acg gca				2496
Lys Ala Ser Ser Val Leu Ala Ala Phe Glu Ala Asn Ser Leu Thr Ala				
820		825	830	
gaa caa ctg gct gat gcc atg aat ctt gat gct aat ttg ctg ttg caa				2544
Glu Gln Leu Ala Asp Ala Met Asn Leu Asp Ala Asn Leu Leu Leu Gln				
835		840	845	
gcc agt att caa gca caa aat cat caa cat ctt ccc cca gta act cca				2592
Ala Ser Ile Gln Ala Gln Asn His Gln His Leu Pro Pro Val Thr Pro				
850		855	860	
gaa aat gcg ttc tcc tgt tgg aca tct atc aat act atc ctg caa tgg				2640
Glu Asn Ala Phe Ser Cys Trp Thr Ser Ile Asn Thr Ile Leu Gln Trp				
865		870	875	880
gtt aat gtc gca caa caa ttg aat gtc gcc cca cag ggc gtt tcc gct				2688
Val Asn Val Ala Gln Gln Leu Asn Val Ala Pro Gln Gly Val Ser Ala				
885		890	895	
ttg gtc ggg ctg gat tat att caa tca atg aaa gag aca ccg acc tat				2736
Leu Val Gly Leu Asp Tyr Ile Gln Ser Met Lys Glu Thr Pro Thr Tyr				
900		905	910	
gcc cag tgg gaa aac gcg gca ggc gta tta acc gcc ggg ttg aat tca				2784
Ala Gln Trp Glu Asn Ala Ala Gly Val Leu Thr Ala Gly Leu Asn Ser				
915		920	925	
caa cag gct aat aca tta cac gct ttt ctg gat gaa tct cgc agt gcc				2832
Gln Gln Ala Asn Thr Leu His Ala Phe Leu Asp Glu Ser Arg Ser Ala				
930		935	940	

gca tta agc acc tac tat atc cgt caa gtc gcc aag gca gcg gcg gct Ala Leu Ser Thr Tyr Tyr Ile Arg Gln Val Ala Lys Ala Ala Ala Ala 945 950 955 960	2880
att aaa agc cgt gat gac ttg tat caa tac tta ctg att gat aat cag Ile Lys Ser Arg Asp Asp Leu Tyr Gln Tyr Leu Leu Ile Asp Asn Gln 965 970 975	2928
gtt tct gcg gca ata aaa acc acc cgg atc gcc gaa gcc att gcc agt Val Ser Ala Ala Ile Lys Thr Thr Arg Ile Ala Glu Ala Ile Ala Ser 980 985 990	2976
att caa ctg tac gtc aac cgg gca ttg gaa aat gtg gaa gaa aat gcc Ile Gln Leu Tyr Val Asn Arg Ala Leu Glu Asn Val Glu Glu Asn Ala 995 1000 1005	3024
aat tcg ggg gtt atc agc cgc caa ttc ttt atc gac tgg gac aaa Asn Ser Gly Val Ile Ser Arg Gln Phe Phe Ile Asp Trp Asp Lys 1010 1015 1020	3069
tac aat aaa cgc tac agc act tgg gcg ggt gtt tct caa tta gtt Tyr Asn Lys Arg Tyr Ser Thr Trp Ala Gly Val Ser Gln Leu Val 1025 1030 1035	3114
tac tac ccg gaa aac tat att gat ccg acc atg cgt atc gga caa Tyr Tyr Pro Glu Asn Tyr Ile Asp Pro Thr Met Arg Ile Gly Gln 1040 1045 1050	3159
acc aaa atg atg gac gca tta ctg caa tcc gtc agc caa agc caa Thr Lys Met Met Asp Ala Leu Leu Gln Ser Val Ser Gln Ser Gln 1055 1060 1065	3204
tta aac gcc gat acc gtc gaa gat gcc ttt atg tct tat ctg aca Leu Asn Ala Asp Thr Val Glu Asp Ala Phe Met Ser Tyr Leu Thr 1070 1075 1080	3249
tcg ttt gaa caa gtg gct aat ctt aaa gtt att agc gca tat cac Ser Phe Glu Gln Val Ala Asn Leu Lys Val Ile Ser Ala Tyr His 1085 1090 1095	3294
gat aat att aat aac gat caa ggg ctg acc tat ttt atc gga ctc Asp Asn Ile Asn Asn Asp Gln Gly Leu Thr Tyr Phe Ile Gly Leu 1100 1105 1110	3339
agt gaa act gat gcc ggt gaa tat tat tgg cgc agt gtc gat cac Ser Glu Thr Asp Ala Gly Glu Tyr Tyr Trp Arg Ser Val Asp His 1115 1120 1125	3384
agt aaa ttc aac gac ggt aaa ttc gcg gct aat gcc tgg agt gaa Ser Lys Phe Asn Asp Gly Lys Phe Ala Ala Asn Ala Trp Ser Glu 1130 1135 1140	3429
tgg cat aaa att gat tgt cca att aac cct tat aaa agc act atc Trp His Lys Ile Asp Cys Pro Ile Asn Pro Tyr Lys Ser Thr Ile 1145 1150 1155	3474

cgt cca gtg ata tat aaa tcc	cgc ctg tat ctg ctc	tgg ttg gaa	3519
Arg Pro Val Ile Tyr Lys Ser	Arg Leu Tyr Leu Leu	Trp Leu Glu	
1160	1165	1170	
caa aag gag atc acc aaa cag	aca gga aat agt aaa	gat ggc tat	3564
Gln Lys Glu Ile Thr Lys Gln	Thr Gly Asn Ser Lys	Asp Gly Tyr	
1175	1180	1185	
caa act gaa acg gat tat cgt	tat gaa cta aaa ttg	gcg cat atc	3609
Gln Thr Glu Thr Asp Tyr Arg	Tyr Glu Leu Lys Leu	Ala His Ile	
1190	1195	1200	
cgc tat gat ggc act tgg aat	acg cca atc acc ttt	gat gtc aat	3654
Arg Tyr Asp Gly Thr Trp Asn	Thr Pro Ile Thr Phe	Asp Val Asn	
1205	1210	1215	
aaa aaa ata tcc gag cta aaa	ctg gaa aaa aat aga	gcg ccc gga	3699
Lys Lys Ile Ser Glu Leu Lys	Leu Glu Lys Asn Arg	Ala Pro Gly	
1220	1225	1230	
ctc tat tgt gcc ggt tat caa	ggg gaa gat acg ttg	ctg gtg atg	3744
Leu Tyr Cys Ala Gly Tyr Gln	Gly Glu Asp Thr Leu	Leu Val Met	
1235	1240	1245	
ttt tat aac caa caa gac aca	cta gat agt tat aaa	aac gct tca	3789
Phe Tyr Asn Gln Gln Asp Thr	Leu Asp Ser Tyr Lys	Asn Ala Ser	
1250	1255	1260	
atg caa gga cta tat atc ttt	gct gat atg gca tcc	aaa gat atg	3834
Met Gln Gly Leu Tyr Ile Phe	Ala Asp Met Ala Ser	Lys Asp Met	
1265	1270	1275	
acc cca gaa cag agc aat gtt	tat cgg gat aat agc	tat caa caa	3879
Thr Pro Glu Gln Ser Asn Val	Tyr Arg Asp Asn Ser	Tyr Gln Gln	
1280	1285	1290	
ttt gat acc aat aat gtc aga	aga gtg aat aac cgc	tat gca gag	3924
Phe Asp Thr Asn Asn Val Arg	Arg Val Asn Asn Arg	Tyr Ala Glu	
1295	1300	1305	
gat tat gag att cct tcc tcg	gta agt agc cgt aaa	gac tat ggt	3969
Asp Tyr Glu Ile Pro Ser Ser	Val Ser Ser Arg Lys	Asp Tyr Gly	
1310	1315	1320	
tgg gga gat tat tac ctc agc	atg gta tat aac gga	gat att cca	4014
Trp Gly Asp Tyr Tyr Leu Ser	Met Val Tyr Asn Gly	Asp Ile Pro	
1325	1330	1335	
act atc aat tac aaa gcc gca	tca agt gat tta aaa	atc tat atc	4059
Thr Ile Asn Tyr Lys Ala Ala	Ser Ser Asp Leu Lys	Ile Tyr Ile	
1340	1345	1350	
tca cca aaa tta aga att att	cat aat gga tat gaa	gga cag aag	4104
Ser Pro Lys Leu Arg Ile Ile	His Asn Gly Tyr Glu	Gly Gln Lys	
1355	1360	1365	
cgc aat caa tgc aat ctg atg	aat aaa tat ggc aaa	cta ggt gat	4149

Arg Asn Gln Cys Asn Leu Met Asn Lys Tyr Gly Lys Leu Gly Asp	
1370 1375 1380	
aaa ttt att gtt tat act agc ttg ggg gtc aat cca aat aac tcg	4194
Lys Phe Ile Val Tyr Thr Ser Leu Gly Val Asn Pro Asn Asn Ser	
1385 1390 1395	
tca aat aag ctc atg ttt tac ccc gtc tat caa tat agc gga aac	4239
Ser Asn Lys Leu Met Phe Tyr Pro Val Tyr Gln Tyr Ser Gly Asn	
1400 1405 1410	
acc agt gga ctc aat caa ggg aga cta cta ttc cac cgt gac acc	4284
Thr Ser Gly Leu Asn Gln Gly Arg Leu Leu Phe His Arg Asp Thr	
1415 1420 1425	
act tat cca tct aaa gta gaa gct tgg att cct gga gca aaa cgt	4329
Thr Tyr Pro Ser Lys Val Glu Ala Trp Ile Pro Gly Ala Lys Arg	
1430 1435 1440	
tct cta acc aac caa aat gcc gcc att ggt gat gat tat gct aca	4374
Ser Leu Thr Asn Gln Asn Ala Ala Ile Gly Asp Asp Tyr Ala Thr	
1445 1450 1455	
gac tct ctg aat aaa ccg gat gat ctt aag caa tat atc ttt atg	4419
Asp Ser Leu Asn Lys Pro Asp Asp Leu Lys Gln Tyr Ile Phe Met	
1460 1465 1470	
act gac agt aaa ggg act gct act gat gtc tca ggc cca gta gag	4464
Thr Asp Ser Lys Gly Thr Ala Thr Asp Val Ser Gly Pro Val Glu	
1475 1480 1485	
att aat act gca att tct cca gca aaa gtt cag ata ata gtc aaa	4509
Ile Asn Thr Ala Ile Ser Pro Ala Lys Val Gln Ile Ile Val Lys	
1490 1495 1500	
gcg ggt ggc aag gag caa act ttt acc gca gat aaa gat gtc tcc	4554
Ala Gly Gly Lys Glu Gln Thr Phe Thr Ala Asp Lys Asp Val Ser	
1505 1510 1515	
att cag cca tca cct agc ttt gat gaa atg aat tat caa ttt aat	4599
Ile Gln Pro Ser Pro Ser Phe Asp Glu Met Asn Tyr Gln Phe Asn	
1520 1525 1530	
gcc ctt gaa ata gac ggt tct ggt ctg aat ttt att aac aac tca	4644
Ala Leu Glu Ile Asp Gly Ser Gly Leu Asn Phe Ile Asn Asn Ser	
1535 1540 1545	
gcc agt att gat gtt act ttt acc gca ttt gcg gag gat ggc cgc	4689
Ala Ser Ile Asp Val Thr Phe Thr Ala Phe Ala Glu Asp Gly Arg	
1550 1555 1560	
aaa ctg ggt tat gaa agt ttc agt att cct gtt acc ctc aag gta	4734
Lys Leu Gly Tyr Glu Ser Phe Ser Ile Pro Val Thr Leu Lys Val	
1565 1570 1575	
agt acc gat aat gcc ctg acc ctg cac cat aat gaa aat ggt gcg	4779
Ser Thr Asp Asn Ala Leu Thr Leu His His Asn Glu Asn Gly Ala	

1580	1585	1590	
caa tat atg caa tgg caa tcc	tat cgt acc cgc ctg	aat act cta	4824
Gln Tyr Met Gln Trp Gln Ser	Tyr Arg Thr Arg Leu	Asn Thr Leu	
1595	1600	1605	
ttt gcc cgc cag ttg gtt gca	cgc gcc acc acc gga	atc gat aca	4869
Phe Ala Arg Gln Leu Val Ala	Arg Ala Thr Thr Gly	Ile Asp Thr	
1610	1615	1620	
att ctg agt atg gaa act cag	aat att cag gaa ccg	cag tta ggc	4914
Ile Leu Ser Met Glu Thr Gln	Asn Ile Gln Glu Pro	Gln Leu Gly	
1625	1630	1635	
aaa ggt ttc tat gct acg ttc	gtg ata cct ccc tat	aac cta tca	4959
Lys Gly Phe Tyr Ala Thr Phe	Val Ile Pro Pro Tyr	Asn Leu Ser	
1640	1645	1650	
act cat ggt gat gaa cgt tgg	ttt aag ctt tat atc	aaa cat gtt	5004
Thr His Gly Asp Glu Arg Trp	Phe Lys Leu Tyr Ile	Lys His Val	
1655	1660	1665	
gtt gat aat aat tca cat att	atc tat tca ggc cag	cta aca gat	5049
Val Asp Asn Asn Ser His Ile	Ile Tyr Ser Gly Gln	Leu Thr Asp	
1670	1675	1680	
aca aat ata aac atc aca tta	ttt att cct ctt gat	gat gtc cca	5094
Thr Asn Ile Asn Ile Thr Leu	Phe Ile Pro Leu Asp	Asp Val Pro	
1685	1690	1695	
ttg aat caa gat tat cac gcc	aag gtt tat atg acc	ttc aag aaa	5139
Leu Asn Gln Asp Tyr His Ala	Lys Val Tyr Met Thr	Phe Lys Lys	
1700	1705	1710	
tca cca tca gat ggt acc tgg	tgg ggc cct cac ttt	gtt aga gat	5184
Ser Pro Ser Asp Gly Thr Trp	Trp Gly Pro His Phe	Val Arg Asp	
1715	1720	1725	
gat aaa gga ata gta aca ata	aac cct aaa tcc att	ttg acc cat	5229
Asp Lys Gly Ile Val Thr Ile	Asn Pro Lys Ser Ile	Leu Thr His	
1730	1735	1740	
ttt gag agc gtc aat gtc ctg	aat aat att agt agc	gaa cca atg	5274
Phe Glu Ser Val Asn Val Leu	Asn Asn Ile Ser Ser	Glu Pro Met	
1745	1750	1755	
gat ttc agc ggc gct aac agc	ctc tat ttc tgg gaa	ctg ttc tac	5319
Asp Phe Ser Gly Ala Asn Ser	Leu Tyr Phe Trp Glu	Leu Phe Tyr	
1760	1765	1770	
tat acc ccg atg ctg gtt gct	caa cgt ttg ctg cat	gaa cag aac	5364
Tyr Thr Pro Met Leu Val Ala	Gln Arg Leu Leu His	Glu Gln Asn	
1775	1780	1785	
ttc gat gaa gcc aac cgt tgg	ctg aaa tat gtc tgg	agt cca tcc	5409
Phe Asp Glu Ala Asn Arg Trp	Leu Lys Tyr Val Trp	Ser Pro Ser	
1790	1795	1800	

ggt tat att gtc cac ggc cag att cag aac tac cag tgg aac gtc Gly Tyr Ile Val His Gly Gln Ile Gln Asn Tyr Gln Trp Asn Val 1805 1810 1815	5454
cgc ccg tta ctg gaa gac acc agt tgg aac agt gat cct ttg gat Arg Pro Leu Leu Glu Asp Thr Ser Trp Asn Ser Asp Pro Leu Asp 1820 1825 1830	5499
tcc gtc gat cct gac gcg gta gca cag cac gat cca atg cac tac Ser Val Asp Pro Asp Ala Val Ala Gln His Asp Pro Met His Tyr 1835 1840 1845	5544
aaa gtt tca act ttt atg cgt acc ttg gat cta ttg ata gca cgc Lys Val Ser Thr Phe Met Arg Thr Leu Asp Leu Leu Ile Ala Arg 1850 1855 1860	5589
ggc gac cat gct tat cgc caa ctg gaa cga gat aca ctc aac gaa Gly Asp His Ala Tyr Arg Gln Leu Glu Arg Asp Thr Leu Asn Glu 1865 1870 1875	5634
gcg aag atg tgg tat atg caa gcg ctg cat cta tta ggt gac aaa Ala Lys Met Trp Tyr Met Gln Ala Leu His Leu Leu Gly Asp Lys 1880 1885 1890	5679
cct tat cta ccg ctg agt acg aca tgg agt gat cca cga cta gac Pro Tyr Leu Pro Leu Ser Thr Thr Trp Ser Asp Pro Arg Leu Asp 1895 1900 1905	5724
aga gcc gcg gat atc act acc caa aat gct cac gac agc gca ata Arg Ala Ala Asp Ile Thr Thr Gln Asn Ala His Asp Ser Ala Ile 1910 1915 1920	5769
gtc gct ctg cgg cag aat ata cct aca ccg gca cct tta tca ttg Val Ala Leu Arg Gln Asn Ile Pro Thr Pro Ala Pro Leu Ser Leu 1925 1930 1935	5814
cgc agc gct aat acc ctg act gat ctc ttc ctg ccg caa atc aat Arg Ser Ala Asn Thr Leu Thr Asp Leu Phe Leu Pro Gln Ile Asn 1940 1945 1950	5859
gaa gtg atg atg aat tac tgg cag aca tta gct cag aga gta tac Glu Val Met Met Asn Tyr Trp Gln Thr Leu Ala Gln Arg Val Tyr 1955 1960 1965	5904
aat ctg cgt cat aac ctc tct atc gac ggc cag ccg tta tat ctg Asn Leu Arg His Asn Leu Ser Ile Asp Gly Gln Pro Leu Tyr Leu 1970 1975 1980	5949
cca atc tat gcc aca ccg gcc gat ccg aaa gcg tta ctc agc gcc Pro Ile Tyr Ala Thr Pro Ala Asp Pro Lys Ala Leu Leu Ser Ala 1985 1990 1995	5994
gcc gtt gcc act tct caa ggt gga ggc aag cta ccg gaa tca ttt Ala Val Ala Thr Ser Gln Gly Gly Gly Lys Leu Pro Glu Ser Phe 2000 2005 2010	6039

atg tcc	ctg tgg	cgt ttc	ccg	cac atg	ctg gaa	aat	gcg cgc	ggc	6084
Met Ser	Leu Trp	Arg Phe	Pro	His Met	Leu Glu	Asn	Ala Arg	Gly	
2015			2020			2025			
atg gtt	agc cag	ctc acc	cag	ttc ggc	tcc acg	tta	caa aat	att	6129
Met Val	Ser Gln	Leu Thr	Gln	Phe Gly	Ser Thr	Leu	Gln Asn	Ile	
2030			2035			2040			
atc gaa	cgt cag	gac gcg	gaa	gcg ctc	aat gcg	tta	tta caa	aat	6174
Ile Glu	Arg Gln	Asp Ala	Glu	Ala Leu	Asn Ala	Leu	Leu Gln	Asn	
2045			2050			2055			
cag gcc	gcc gag	ctg ata	ttg	act aac	ctg agc	att	cag gac	aaa	6219
Gln Ala	Ala Glu	Leu Ile	Leu	Thr Asn	Leu Ser	Ile	Gln Asp	Lys	
2060			2065			2070			
acc att	gaa gaa	ttg gat	gcc	gag aaa	acg gtg	ttg	gaa aaa	tcc	6264
Thr Ile	Glu Glu	Leu Asp	Ala	Glu Lys	Thr Val	Leu	Glu Lys	Ser	
2075			2080			2085			
aaa gcg	gga gca	caa tcg	cgc	ttt gat	agc tac	ggc	aaa ctg	tac	6309
Lys Ala	Gly Ala	Gln Ser	Arg	Phe Asp	Ser Tyr	Gly	Lys Leu	Tyr	
2090			2095			2100			
gat gag	aat atc	aac gcc	ggt	gaa aac	caa gcc	atg	acg cta	cga	6354
Asp Glu	Asn Ile	Asn Ala	Gly	Glu Asn	Gln Ala	Met	Thr Leu	Arg	
2105			2110			2115			
gcg tcc	gcc gcc	ggg ctt	acc	acg gca	gtt cag	gca	tcc cgt	ctg	6399
Ala Ser	Ala Ala	Gly Leu	Thr	Thr Ala	Val Gln	Ala	Ser Arg	Leu	
2120			2125			2130			
gcc ggt	gcg gcg	gct gat	ctg	gtg cct	aac atc	ttc	ggc ttt	gcc	6444
Ala Gly	Ala Ala	Ala Asp	Leu	Val Pro	Asn Ile	Phe	Gly Phe	Ala	
2135			2140			2145			
ggt ggc	ggc agc	cgt tgg	ggg	gct atc	gct gag	gcg	aca ggt	tat	6489
Gly Gly	Gly Ser	Arg Trp	Gly	Ala Ile	Ala Glu	Ala	Thr Gly	Tyr	
2150			2155			2160			
gtg atg	gaa ttc	tcc gcg	aat	gtt atg	aac acc	gaa	gcg gat	aaa	6534
Val Met	Glu Phe	Ser Ala	Asn	Val Met	Asn Thr	Glu	Ala Asp	Lys	
2165			2170			2175			
att agc	caa tct	gaa acc	tac	cgt cgt	cgc cgt	cag	gag tgg	gag	6579
Ile Ser	Gln Ser	Glu Thr	Tyr	Arg Arg	Arg Arg	Gln	Glu Trp	Glu	
2180			2185			2190			
atc cag	cgg aat	aat gcc	gaa	gcg gaa	ttg aag	caa	atc gat	gct	6624
Ile Gln	Arg Asn	Asn Ala	Glu	Ala Glu	Leu Lys	Gln	Ile Asp	Ala	
2195			2200			2205			
cag ctc	aaa tca	ctc gct	gta	cgc cgc	gaa gcc	gcc	gta ttg	cag	6669
Gln Leu	Lys Ser	Leu Ala	Val	Arg Arg	Glu Ala	Ala	Val Leu	Gln	
2210			2215			2220			
aaa acc	agt ctg	aaa acc	caa	caa gaa	cag acc	caa	tct caa	ttg	6714

Lys Thr 2225	Ser Leu Lys Thr 2230	Gln Gln Glu Gln Thr 2235	Ser Gln Leu	
gcc ttc Ala Phe 2240	ctg caa cgt aag ttc Leu Gln Arg Lys Phe 2245	agc aat cag gcg tta Ser Asn Gln Ala Leu 2250	tac aac tgg Tyr Asn Trp	6759
ctg cgt Leu Arg 2255	ggt cga ctg gcg gcg Gly Arg Leu Ala Ala 2260	att tac ttc cag ttc Ile Tyr Phe Gln Phe 2265	tac gat ttg Tyr Asp Leu	6804
gcc gtc Ala Val 2270	gcg cgt tgc ctg atg Ala Arg Cys Leu Met 2275	gca gaa caa gct tac Ala Glu Gln Ala Tyr 2280	cgt tgg gaa Arg Trp Glu	6849
ctc aat Leu Asn 2285	gat gac tct gcc cgc Asp Asp Ser Ala Arg 2290	ttc att aaa ccg ggc Phe Ile Lys Pro Gly 2295	gcc tgg cag Ala Trp Gln	6894
gga acc Gly Thr 2300	tat gcc ggt ctg ctt Tyr Ala Gly Leu Leu 2305	gca ggt gaa acc ttg Ala Gly Glu Thr Leu 2310	atg ctg agt Met Leu Ser	6939
ctg gca Leu Ala 2315	caa atg gaa gac gct Gln Met Glu Asp Ala 2320	cat ctg aaa cgc gat His Leu Lys Arg Asp 2325	aaa cgc gca Lys Arg Ala	6984
tta gag Leu Glu 2330	gtt gaa cgc aca gta Val Glu Arg Thr Val 2335	tcg ctg gcc gaa gtt Ser Leu Ala Glu Val 2340	tat gca gga Tyr Ala Gly	7029
tta cca Leu Pro 2345	aaa gat aac ggt cca Lys Asp Asn Gly Pro 2350	ttt tcc ctg gct cag Phe Ser Leu Ala Gln 2355	gaa att gac Glu Ile Asp	7074
aag ctg Lys Leu 2360	gtg agt caa ggt tca Val Ser Gln Gly Ser 2365	ggc agt gcc ggc agt Gly Ser Ala Gly Ser 2370	ggg aat aat Gly Asn Asn	7119
aat ttg Asn Leu 2375	gcg ttc ggc gcc ggc Ala Phe Gly Ala Gly 2380	acg gac act aaa acc Thr Asp Thr Lys Thr 2385	tct ttg cag Ser Leu Gln	7164
gca tca Ala Ser 2390	gtt tca ttc gct gat Val Ser Phe Ala Asp 2395	ttg aaa att cgt gaa Leu Lys Ile Arg Glu 2400	gat tac ccg Asp Tyr Pro	7209
gca tcg Ala Ser 2405	ctt ggc aaa att cga Leu Gly Lys Ile Arg 2410	cgt atc aaa cag atc Arg Ile Lys Gln Ile 2415	agc gtc act Ser Val Thr	7254
ttg ccc Leu Pro 2420	gcg cta ctg gga ccg Ala Leu Leu Gly Pro 2425	tat cag gat gta cag Tyr Gln Asp Val Gln 2430	gca ata ttg Ala Ile Leu	7299
tct tac Ser Tyr	ggc gat aaa gcc gga Gly Asp Lys Ala Gly	tta gct aac ggc tgt Leu Ala Asn Gly Cys	gaa gcg ctg Glu Ala Leu	7344

2435	2440	2445	
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Ala Val Ser His Gly Met Asn	Asp Ser Gly Gln Phe	Gln Leu Asp	
2450	2455	2460	
ttc aac gat ggc aaa ttc ctg	cca ttc gaa ggc atc	gcc att gat	7434
Phe Asn Asp Gly Lys Phe Leu	Pro Phe Glu Gly Ile	Ala Ile Asp	
2465	2470	2475	
caa ggc acg ctg aca ctg agc	ttc cca aat gca tct	atg ccg gag	7479
Gln Gly Thr Leu Thr Leu Ser	Phe Pro Asn Ala Ser	Met Pro Glu	
2480	2485	2490	
aaa ggt aaa caa gcc act atg	tta aaa acc ctg aac	gat atc att	7524
Lys Gly Lys Gln Ala Thr Met	Leu Lys Thr Leu Asn	Asp Ile Ile	
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ttg cat att cgc tac acc att	aaa taa		7551
Leu His Ile Arg Tyr Thr Ile	Lys		
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Gly Gly Gly Ala Ile Thr Gly Met Gly Glu Ala Leu Thr Pro Ala Gly	
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Pro Asp Gly Met Ala Ala Leu Ser Leu Pro Leu Pro Ile Ser Ala Gly	
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cgt ggt tac gca ccc tcg ctc act ctg aat tac aac agt gga acc ggt	192
Arg Gly Tyr Ala Pro Ser Leu Thr Leu Asn Tyr Asn Ser Gly Thr Gly	
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Asn Ser Pro Phe Gly Leu Gly Trp Asp Cys Gly Val Met Ala Ile Arg	
65 70 75 80	
cgt cgc acc agt acc ggc gta ccg aat tac gat gaa acc gat act ttt	288
Arg Arg Thr Ser Thr Gly Val Pro Asn Tyr Asp Glu Thr Asp Thr Phe	
85 90 95	

ctg ggg ccg gaa ggt gaa gtg ttg gtc gta gca tta aat gag gca ggt Leu Gly Pro Glu Gly Glu Val Leu Val Val Ala Leu Asn Glu Ala Gly 100 105 110	336
caa gct gat atc cgc agt gaa tcc tca ttg cag ggc atc aat ttg ggt Gln Ala Asp Ile Arg Ser Glu Ser Ser Leu Gln Gly Ile Asn Leu Gly 115 120 125	384
gcg acc ttc acc gtt acc tgt tat cgc tcc cgc cta gaa agc cac ttt Ala Thr Phe Thr Val Thr Cys Tyr Arg Ser Arg Leu Glu Ser His Phe 130 135 140	432
aac cgg ttg gaa tac tgg caa ccc caa aca acc ggc gca acc gat ttc Asn Arg Leu Glu Tyr Trp Gln Pro Gln Thr Thr Gly Ala Thr Asp Phe 145 150 155 160	480
tgg ctg ata tac agc ccc gac gga cag gtc cat tta ctg ggc aaa aat Trp Leu Ile Tyr Ser Pro Asp Gly Gln Val His Leu Leu Gly Lys Asn 165 170 175	528
cct cag gca cgt atc agc aat cca ctc aat gtt aac caa aca gcg caa Pro Gln Ala Arg Ile Ser Asn Pro Leu Asn Val Asn Gln Thr Ala Gln 180 185 190	576
tgg ctg ttg gaa gcc tcg ata tca tcc cac agc gaa cag att tat tat Trp Leu Leu Glu Ala Ser Ile Ser Ser His Ser Glu Gln Ile Tyr Tyr 195 200 205	624
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gcc cac ccc agc gca acc gtt cag cgc tac ctg caa aca gta cat tac Ala His Pro Ser Ala Thr Val Gln Arg Tyr Leu Gln Thr Val His Tyr 225 230 235 240	720
ggg aac ctg acc gcc agc gac gtt ttt cct aca cta aac gga gat gac Gly Asn Leu Thr Ala Ser Asp Val Phe Pro Thr Leu Asn Gly Asp Asp 245 250 255	768
cca ctt aaa tct ggc tgg atg ttc tgt tta gta ttt gac tac ggt gag Pro Leu Lys Ser Gly Trp Met Phe Cys Leu Val Phe Asp Tyr Gly Glu 260 265 270	816
cgc aaa aac agc tta tct gaa atg ccg ctg ttt aaa gcc aca ggc aat Arg Lys Asn Ser Leu Ser Glu Met Pro Leu Phe Lys Ala Thr Gly Asn 275 280 285	864
tgg ctt tgc cga aaa gac cgt ttt tcc cgt tat gag tac ggt ttt gaa Trp Leu Cys Arg Lys Asp Arg Phe Ser Arg Tyr Glu Tyr Gly Phe Glu 290 295 300	912
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ggg gaa gag atg aat gcg gtc acc tgg ggg aaa atg caa ctc ctt ccc Gly Glu Glu Met Asn Ala Val Thr Trp Gly Lys Met Gln Leu Leu Pro 435 440 445	1344
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gac ggg caa ctg gac tgg gtg att acc ggg ccg ggg cta agg ggc tat Asp Gly Gln Leu Asp Trp Val Ile Thr Gly Pro Gly Leu Arg Gly Tyr 465 470 475 480	1440
cac agc caa cac ccg gat ggc agt tgg acg cgt ttt acg cca tta cat His Ser Gln His Pro Asp Gly Ser Trp Thr Arg Phe Thr Pro Leu His 485 490 495	1488
gcc ctg ccg ata gaa tat tct cat cct cgc gct caa ctt gcc gat tta Ala Leu Pro Ile Glu Tyr Ser His Pro Arg Ala Gln Leu Ala Asp Leu 500 505 510	1536
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cgc tta tat gtc aat aac cgt gat ggt ttt acc gaa ggg ccg gat gtg Arg Leu Tyr Val Asn Asn Arg Asp Gly Phe Thr Glu Gly Arg Asp Val 530 535 540	1632
gtg caa tcc ggt gat atc acc ctg ccg cta ccg ggc gcc gat gcc cgt	1680

Val	Gln	Ser	Gly	Asp	Ile	Thr	Leu	Pro	Leu	Pro	Gly	Ala	Asp	Ala	Arg		
545					550					555					560		
aag	tta	gtg	gca	ttt	agt	gac	gta	ctg	ggg	tca	ggc	caa	gca	cat	ctg		1728
Lys	Leu	Val	Ala	Phe	Ser	Asp	Val	Leu	Gly	Ser	Gly	Gln	Ala	His	Leu		
				565					570					575			
gtt	gaa	gtt	agt	gca	act	caa	gtc	acc	tgc	tgg	ccg	aat	ctg	ggg	cat		1776
Val	Glu	Val	Ser	Ala	Thr	Gln	Val	Thr	Cys	Trp	Pro	Asn	Leu	Gly	His		
				580				585					590				
ggc	cgt	ttt	ggg	cag	cca	atc	gta	ttg	ccg	gga	ttc	agc	caa	tct	gcc		1824
Gly	Arg	Phe	Gly	Gln	Pro	Ile	Val	Leu	Pro	Gly	Phe	Ser	Gln	Ser	Ala		
		595					600						605				
gcc	agt	ttt	aat	cct	gat	cga	gtt	cat	ctg	gcc	gat	ttg	gat	ggg	agc		1872
Ala	Ser	Phe	Asn	Pro	Asp	Arg	Val	His	Leu	Ala	Asp	Leu	Asp	Gly	Ser		
		610					615				620						
ggc	cct	gcc	gat	ttg	att	tat	gtt	cat	gct	gac	cgt	ctg	gat	att	ttc		1920
Gly	Pro	Ala	Asp	Leu	Ile	Tyr	Val	His	Ala	Asp	Arg	Leu	Asp	Ile	Phe		
					630					635					640		
agc	aat	gaa	agt	ggc	aac	ggg	ttt	gca	aaa	cca	ttc	aca	ctc	tct	ttt		1968
Ser	Asn	Glu	Ser	Gly	Asn	Gly	Phe	Ala	Lys	Pro	Phe	Thr	Leu	Ser	Phe		
				645					650					655			
cct	gac	ggc	ctg	cgt	ttt	gat	gat	acc	tgc	cag	ttg	caa	gta	gcc	gat		2016
Pro	Asp	Gly	Leu	Arg	Phe	Asp	Asp	Thr	Cys	Gln	Leu	Gln	Val	Ala	Asp		
			660					665					670				
gta	caa	ggg	tta	ggc	gtt	gtc	agc	ctg	atc	cta	agc	gta	ccg	cat	atg		2064
Val	Gln	Gly	Leu	Gly	Val	Val	Ser	Leu	Ile	Leu	Ser	Val	Pro	His	Met		
		675					680					685					
gcg	cca	cat	cat	tgg	cgc	tgc	gat	ctg	acc	aac	gcg	aaa	ccg	tgg	tta		2112
Ala	Pro	His	His	Trp	Arg	Cys	Asp	Leu	Thr	Asn	Ala	Lys	Pro	Trp	Leu		
		690				695					700						
ctc	agt	gaa	acg	aac	aac	aat	atg	ggg	gcc	aat	cac	acc	ttg	cat	tac		2160
Leu	Ser	Glu	Thr	Asn	Asn	Asn	Met	Gly	Ala	Asn	His	Thr	Leu	His	Tyr		
					710				715						720		
cgt	agc	tct	gtc	cag	ttc	tgg	ctg	gat	gaa	aaa	gct	gcg	gca	ttg	gct		2208
Arg	Ser	Ser	Val	Gln	Phe	Trp	Leu	Asp	Glu	Lys	Ala	Ala	Ala	Leu	Ala		
				725					730					735			
acc	gga	caa	aca	ccg	gtc	tgt	tac	ctg	ccc	ttc	ccg	gtc	cat	acc	ctt		2256
Thr	Gly	Gln	Thr	Pro	Val	Cys	Tyr	Leu	Pro	Phe	Pro	Val	His	Thr	Leu		
				740				745					750				
tgg	caa	aca	gaa	acc	gag	gat	gaa	atc	agc	ggc	aat	aag	tta	gtg	acc		2304
Trp	Gln	Thr	Glu	Thr	Glu	Asp	Glu	Ile	Ser	Gly	Asn	Lys	Leu	Val	Thr		
			755				760					765					
acg	tta	cgt	tat	gct	cac	ggc	gct	tgg	gat	gga	cgt	gaa	cgg	gaa	ttt		2352
Thr	Leu	Arg	Tyr	Ala	His	Gly	Ala	Trp	Asp	Gly	Arg	Glu	Arg	Glu	Phe		

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Arg Gly Phe Gly Tyr Val Glu Gln Thr Asp Ser His Gln Leu Ala Gln			
785	790	795	800
ggc aat gcg ccg gaa cgt aca cca ccg gca ctc acc aaa agc tgg tat			2448
Gly Asn Ala Pro Glu Arg Thr Pro Pro Ala Leu Thr Lys Ser Trp Tyr			
	805	810	815
gcc acc gga tta cct gcg gta gat aat gcg tta tcc gcc ggg tat tgg			2496
Ala Thr Gly Leu Pro Ala Val Asp Asn Ala Leu Ser Ala Gly Tyr Trp			
	820	825	830
cgt ggc gat aag caa gct ttc gcc ggt ttt acg cca cgt ttt act ctc			2544
Arg Gly Asp Lys Gln Ala Phe Ala Gly Phe Thr Pro Arg Phe Thr Leu			
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tgg aaa gag ggc aaa gat gtt cca ctg aca ccg gaa gat gac cat aat			2592
Trp Lys Glu Gly Lys Asp Val Pro Leu Thr Pro Glu Asp Asp His Asn			
	850	855	860
cta tac tgg tta aac ccg gcg cta aaa ggt cag cca ctg cgt agt gaa			2640
Leu Tyr Trp Leu Asn Arg Ala Leu Lys Gly Gln Pro Leu Arg Ser Glu			
	865	870	875
ctc tac ggg ctg gat ggc agc gca cag caa cag atc ccc tat aca gtg			2688
Leu Tyr Gly Leu Asp Gly Ser Ala Gln Gln Gln Ile Pro Tyr Thr Val			
	885	890	895
act gaa tcc cgt cca cag gtg cgc caa tta caa gat ggc gcc acc gtt			2736
Thr Glu Ser Arg Pro Gln Val Arg Gln Leu Gln Asp Gly Ala Thr Val			
	900	905	910
tcc ccg gtg ctc tgg gcc tca gtc gtg gaa agc cgt agt tat cac tac			2784
Ser Pro Val Leu Trp Ala Ser Val Val Glu Ser Arg Ser Tyr His Tyr			
	915	920	925
gaa cgt att atc agt gat ccc cag tgc aat cag gat atc acg ttg tcc			2832
Glu Arg Ile Ile Ser Asp Pro Gln Cys Asn Gln Asp Ile Thr Leu Ser			
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agt gac cta ttc ggg caa cca ctg aaa cag gtt tcc gta caa tat ccc			2880
Ser Asp Leu Phe Gly Gln Pro Leu Lys Gln Val Ser Val Gln Tyr Pro			
	945	950	955
cgc cgc aac aaa cca aca acc aat ccg tat ccc gat acc cta ccg gat			2928
Arg Arg Asn Lys Pro Thr Thr Asn Pro Tyr Pro Asp Thr Leu Pro Asp			
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acg ctg ttt gcc agc agt tat gac gat caa caa cag cta ttg cga tta			2976
Thr Leu Phe Ala Ser Ser Tyr Asp Asp Gln Gln Gln Leu Leu Arg Leu			
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acc tgc cga caa tcc agt tgg cac cat ctt att ggt aat gag cta aga			3024
Thr Cys Arg Gln Ser Ser Trp His His Leu Ile Gly Asn Glu Leu Arg			
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Cys Ala Glu Asn Ser Leu Ile Ala Asp Asp Lys Pro Arg Glu Tyr	
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Pro Leu Lys Thr Pro Thr Arg Gln Ala Leu Ile Ala Phe Thr Glu	
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Ile Thr Pro Asp Glu Leu Pro Gly Ile Leu Thr Gln Ala Gly Tyr	
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Phe Trp Arg Pro Val Ala Gln Arg Asn Ser Leu Leu Thr Gly Lys	
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Met Thr Leu Lys Trp Asp Thr His Tyr Cys Val Ile Thr Gln Thr	
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Gln Asp Ala Ala Gly Leu Thr Val Ser Ala Asn Tyr Asp Trp Arg	
1175 1180 1185	
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Phe Leu Thr Pro Thr Gln Leu Thr Asp Ile Asn Asp Asn Val His	
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Glu Lys Pro Phe Ser Pro Pro Asn Asp Ile Asp Thr Ala Ile Asn	
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Leu Thr Gly Pro Leu Pro Val Ala Gln Cys Leu Val Tyr Ala Pro	
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Ile Gly Leu Pro Pro His Asn Leu Thr Leu Thr Thr Asp Arg Tyr	
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1370 1375 1380	
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Val Glu Asn Thr Lys Thr Arg Trp Ala Val Thr Gly Arg Thr Glu	
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Tyr Asp Asn Lys Gly Gln Thr Ile Arg Thr Tyr Gln Pro Tyr Phe	
1400 1405 1410	
ctc aac gac tgg cga tat gtc agt gat gac agc gcc aga aaa gaa	4284
Leu Asn Asp Trp Arg Tyr Val Ser Asp Asp Ser Ala Arg Lys Glu	
1415 1420 1425	
gcc tat gcg gat act cat att tat gat cca att ggg cga gaa atc	4329

Ala Tyr	Ala Asp Thr His Ile	Tyr Asp Pro Ile Gly	Arg Glu Ile	
1430	1435	1440		
cgg gtt	att act gca aaa ggc	tgg ctg cgc caa agc	caa tat ttc	4374
Arg Val	Ile Thr Ala Lys Gly	Trp Leu Arg Gln Ser	Gln Tyr Phe	
1445	1450	1455		
ccg tgg	ttt acc gtg agt gag	gat gag aat gat acg	gcc gct gat	4419
Pro Trp	Phe Thr Val Ser Glu	Asp Glu Asn Asp Thr	Ala Ala Asp	
1460	1465	1470		
gcg ctg	gtg taa			4431
Ala Leu	Val			
1475				

<210> 23
 <211> 74
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Forward primer used to amplify the TcdB1 sequence from plasmid pBC-AS4.

<400> 23		
atatagtcga cgaatttttaa tctactagta aaaaggagat aaccatgcag aattcacaaa		60
cattcagtgt tacc		74

<210> 24
 <211> 57
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Reverse primer used to amplify the TcdB1 sequence from plasmid pBC-AS4.

<400> 24		
ataatacgat cgtttctcga gtcattacac cagcgcacatca gcggccgtat cattctc		57

<210> 25
 <211> 3132
 <212> DNA
 <213> Photorhabdus luminescens

<220>
 <221> exon
 <222> (1)..(3132)

<400> 25		
atg agt ccg tct gag act act ctt tat act caa acc cca aca gtc agc		48
Met Ser Pro Ser Glu Thr Thr Leu Tyr Thr Gln Thr Pro Thr Val Ser		

1	5	10	15	
gtg tta gat aat cgc ggt ctg tcc att cgt gat att ggt ttt cac cgt				96
Val Leu Asp Asn Arg Gly Leu Ser Ile Arg Asp Ile Gly Phe His Arg				
20		25	30	
att gta atc ggg ggg gat act gac acc cgc gtc acc cgt cac cag tat				144
Ile Val Ile Gly Gly Asp Thr Asp Thr Arg Val Thr Arg His Gln Tyr				
35		40	45	
gat gcc cgt gga cac ctg aac tac agt att gac cca cgc ttg tat gat				192
Asp Ala Arg Gly His Leu Asn Tyr Ser Ile Asp Pro Arg Leu Tyr Asp				
50		55	60	
gca aag cag gct gat aac tca gta aag cct aat ttt gtc tgg cag cat				240
Ala Lys Gln Ala Asp Asn Ser Val Lys Pro Asn Phe Val Trp Gln His				
65		70	75	80
gat ctg gcc ggt cat gcc ctg cgg aca gag agt gtc gat gct ggt cgt				288
Asp Leu Ala Gly His Ala Leu Arg Thr Glu Ser Val Asp Ala Gly Arg				
85		90	95	
act gtt gca ttg aat gat att gaa ggt cgt tcg gta atg aca atg aat				336
Thr Val Ala Leu Asn Asp Ile Glu Gly Arg Ser Val Met Thr Met Asn				
100		105	110	
gcg acc ggt gtt cgt cag acc cgt cgc tat gaa ggc aac acc ttg ccc				384
Ala Thr Gly Val Arg Gln Thr Arg Arg Tyr Glu Gly Asn Thr Leu Pro				
115		120	125	
ggt cgc ttg tta tct gtg agc gag caa gtt ttc aac caa gag agt gct				432
Gly Arg Leu Leu Ser Val Ser Glu Gln Val Phe Asn Gln Glu Ser Ala				
130		135	140	
aaa gtg aca gag cgc ttt atc tgg gct ggg aat aca acc tcg gag aaa				480
Lys Val Thr Glu Arg Phe Ile Trp Ala Gly Asn Thr Thr Ser Glu Lys				
145		150	155	160
gag tat aac ctc tcc ggt ctg tgt ata cgc cac tac gac aca gcg gga				528
Glu Tyr Asn Leu Ser Gly Leu Cys Ile Arg His Tyr Asp Thr Ala Gly				
165		170	175	
gtg acc cgg ttg atg agt cag tca ctg gcg ggc gcc atg cta tcc caa				576
Val Thr Arg Leu Met Ser Gln Ser Leu Ala Gly Ala Met Leu Ser Gln				
180		185	190	
tct cac caa ttg ctg gcg gaa ggg cag gag gct aac tgg agc ggt gac				624
Ser His Gln Leu Leu Ala Glu Gly Gln Glu Ala Asn Trp Ser Gly Asp				
195		200	205	
gac gaa act gtc tgg cag gga atg ctg gca agt gag gtc tat acg aca				672
Asp Glu Thr Val Trp Gln Gly Met Leu Ala Ser Glu Val Tyr Thr Thr				
210		215	220	
caa agt acc act aat gcc atc ggg gct tta ctg acc caa acc gat gcg				720
Gln Ser Thr Thr Asn Ala Ile Gly Ala Leu Leu Thr Gln Thr Asp Ala				
225		230	235	240

aaa ggc aat att cag cgt ctg gct tat gac att gcc ggt cag tta aaa	768
Lys Gly Asn Ile Gln Arg Leu Ala Tyr Asp Ile Ala Gly Gln Leu Lys	
245 250 255	
ggg agt tgg ttg acg gtg aaa ggc cag agt gaa cag gtg att gtt aag	816
Gly Ser Trp Leu Thr Val Lys Gly Gln Ser Glu Gln Val Ile Val Lys	
260 265 270	
tcc ctg agc tgg tca gcc gca ggt cat aaa ttg cgt gaa gag cac ggt	864
Ser Leu Ser Trp Ser Ala Ala Gly His Lys Leu Arg Glu Glu His Gly	
275 280 285	
aac ggc gtg gtt acg gag tac agt tat gag ccg gaa act caa cgt ctg	912
Asn Gly Val Val Thr Glu Tyr Ser Tyr Glu Pro Glu Thr Gln Arg Leu	
290 295 300	
ata ggt atc acc acc cgg cgt gcc gaa ggg agt caa tca gga gcc aga	960
Ile Gly Ile Thr Thr Arg Arg Ala Glu Gly Ser Gln Ser Gly Ala Arg	
305 310 315 320	
gta ttg cag gat cta cgc tat aag tat gat ccg gtg ggg aat gtt atc	1008
Val Leu Gln Asp Leu Arg Tyr Lys Tyr Asp Pro Val Gly Asn Val Ile	
325 330 335	
agt atc cat aat gat gcc gaa gct acc cgc ttt tgg cgt aat cag aaa	1056
Ser Ile His Asn Asp Ala Glu Ala Thr Arg Phe Trp Arg Asn Gln Lys	
340 345 350	
gtg gag ccg gag aat cgc tat gtt tat gat tct ctg tat cag ctt atg	1104
Val Glu Pro Glu Asn Arg Tyr Val Tyr Asp Ser Leu Tyr Gln Leu Met	
355 360 365	
agt gcg aca ggg cgt gaa atg gct aat atc ggt cag caa agc aac caa	1152
Ser Ala Thr Gly Arg Glu Met Ala Asn Ile Gly Gln Gln Ser Asn Gln	
370 375 380	
ctt ccc tca ccc gtt ata cct gtt cct act gac gac agc act tat acc	1200
Leu Pro Ser Pro Val Ile Pro Val Pro Thr Asp Asp Ser Thr Tyr Thr	
385 390 395 400	
aat tac ctt cgt acc tat act tat gac cgt ggc ggt aat ttg gtt caa	1248
Asn Tyr Leu Arg Thr Tyr Thr Tyr Asp Arg Gly Gly Asn Leu Val Gln	
405 410 415	
atc cga cac agt tca ccc gcg act caa aat agt tac acc aca gat atc	1296
Ile Arg His Ser Ser Pro Ala Thr Gln Asn Ser Tyr Thr Thr Asp Ile	
420 425 430	
acc gtt tca agc cgc agt aac cgg gcg gta ttg agt aca tta acg aca	1344
Thr Val Ser Ser Arg Ser Asn Arg Ala Val Leu Ser Thr Leu Thr Thr	
435 440 445	
gat cca acc cga gtg gat gcg cta ttt gat tcc ggc ggt cat cag aag	1392
Asp Pro Thr Arg Val Asp Ala Leu Phe Asp Ser Gly Gly His Gln Lys	
450 455 460	

atg tta ata ccg ggg caa aat ctg gat tgg aat att cgg ggt gaa ttg	1440
Met Leu Ile Pro Gly Gln Asn Leu Asp Trp Asn Ile Arg Gly Glu Leu	
465 470 475 480	
caa cga gtc aca ccg gtg agc cgt gaa aat agc agt gac agt gaa tgg	1488
Gln Arg Val Thr Pro Val Ser Arg Glu Asn Ser Ser Asp Ser Glu Trp	
485 490 495	
tat cgc tat agc agt gat ggc atg cgg ctg cta aaa gtg agt gaa cag	1536
Tyr Arg Tyr Ser Ser Asp Gly Met Arg Leu Leu Lys Val Ser Glu Gln	
500 505 510	
cag acg ggc aac agt act caa gta caa cgg gtg act tat ctg ccg gga	1584
Gln Thr Gly Asn Ser Thr Gln Val Gln Arg Val Thr Tyr Leu Pro Gly	
515 520 525	
tta gag cta ccg aca act ggg gtt gca gat aaa aca acc gaa gat ttg	1632
Leu Glu Leu Arg Thr Thr Gly Val Ala Asp Lys Thr Thr Glu Asp Leu	
530 535 540	
cag gtg att acg gta ggt gaa gcg ggt cgc gca cag gta agg gta ttg	1680
Gln Val Ile Thr Val Gly Glu Ala Gly Arg Ala Gln Val Arg Val Leu	
545 550 555 560	
cac tgg gaa agt ggt aag ccg aca gat att gac aac aat cag gtg cgc	1728
His Trp Glu Ser Gly Lys Pro Thr Asp Ile Asp Asn Asn Gln Val Arg	
565 570 575	
tac agc tac gat aat ctg ctt ggc tcc agc cag ctt gaa ctg gat agc	1776
Tyr Ser Tyr Asp Asn Leu Leu Gly Ser Ser Gln Leu Glu Leu Asp Ser	
580 585 590	
gaa ggg cag att ctc agt cag gaa gag tat tat ccg tat ggc ggt acg	1824
Glu Gly Gln Ile Leu Ser Gln Glu Glu Tyr Tyr Pro Tyr Gly Gly Thr	
595 600 605	
gcg ata tgg gcg gcg aga aat cag aca gaa gcc agc tac aaa ttt att	1872
Ala Ile Trp Ala Ala Arg Asn Gln Thr Glu Ala Ser Tyr Lys Phe Ile	
610 615 620	
cgt tac tcc ggt aaa gag cgg gat gcc act gga ttg tat tat tac ggc	1920
Arg Tyr Ser Gly Lys Glu Arg Asp Ala Thr Gly Leu Tyr Tyr Tyr Gly	
625 630 635 640	
tac cgt tat tat caa cct tgg gtg ggt cga tgg ttg agt gct gat ccg	1968
Tyr Arg Tyr Tyr Gln Pro Trp Val Gly Arg Trp Leu Ser Ala Asp Pro	
645 650 655	
gcg gga acc gtg gat ggg ctg aat ttg tac cga atg gtg agg aat aac	2016
Ala Gly Thr Val Asp Gly Leu Asn Leu Tyr Arg Met Val Arg Asn Asn	
660 665 670	
ccc atc aca ttg act gac cat gac gga tta gca ccg tct cca aat aga	2064
Pro Ile Thr Leu Thr Asp His Asp Gly Leu Ala Pro Ser Pro Asn Arg	
675 680 685	
aat cga aat aca ttt tgg ttt gct tca ttt ttg ttt cgt aaa cct gat	2112

Asn	Arg	Asn	Thr	Phe	Trp	Phe	Ala	Ser	Phe	Leu	Phe	Arg	Lys	Pro	Asp	
690						695					700					
gag	gga	atg	tcc	gcg	tca	atg	aga	cgg	gga	caa	aaa	att	ggc	aga	gcc	2160
Glu	Gly	Met	Ser	Ala	Ser	Met	Arg	Arg	Gly	Gln	Lys	Ile	Gly	Arg	Ala	
705					710					715					720	
att	gcc	ggc	ggg	att	gcg	att	ggc	ggg	ctt	gcg	gct	acc	att	gcc	gct	2208
Ile	Ala	Gly	Gly	Ile	Ala	Ile	Gly	Gly	Leu	Ala	Ala	Thr	Ile	Ala	Ala	
				725					730					735		
acg	gct	ggc	gcg	gct	atc	ccc	gtc	att	ctg	ggg	gtt	gcg	gcc	gta	ggc	2256
Thr	Ala	Gly	Ala	Ala	Ile	Pro	Val	Ile	Leu	Gly	Val	Ala	Ala	Val	Gly	
			740					745					750			
gcg	ggg	att	ggc	gcg	ttg	atg	gga	tat	aac	gtc	ggg	agc	ctg	ctg	gaa	2304
Ala	Gly	Ile	Gly	Ala	Leu	Met	Gly	Tyr	Asn	Val	Gly	Ser	Leu	Leu	Glu	
		755					760					765				
aaa	ggc	ggg	gca	tta	ctt	gct	cga	ctc	gta	cag	ggg	aaa	tcg	acg	tta	2352
Lys	Gly	Gly	Ala	Leu	Leu	Ala	Arg	Leu	Val	Gln	Gly	Lys	Ser	Thr	Leu	
	770					775					780					
gta	cag	tcg	gcg	gct	ggc	gcg	gct	gcc	gga	gcg	agt	tca	gcc	gcg	gct	2400
Val	Gln	Ser	Ala	Ala	Gly	Ala	Ala	Ala	Gly	Ala	Ser	Ser	Ala	Ala	Ala	
785					790					795					800	
tat	ggc	gca	cgg	gca	caa	ggg	gtc	ggg	gtt	gca	tca	gcc	gcc	ggg	gcg	2448
Tyr	Gly	Ala	Arg	Ala	Gln	Gly	Val	Gly	Val	Ala	Ser	Ala	Ala	Gly	Ala	
				805					810					815		
gta	aca	ggg	gct	gtg	gga	tca	tgg	ata	aat	aat	gct	gat	cgg	ggg	att	2496
Val	Thr	Gly	Ala	Val	Gly	Ser	Trp	Ile	Asn	Asn	Ala	Asp	Arg	Gly	Ile	
			820					825					830			
ggc	ggc	gct	att	ggg	gcc	ggg	agt	gcg	gta	ggc	acc	att	gat	act	atg	2544
Gly	Gly	Ala	Ile	Gly	Ala	Gly	Ser	Ala	Val	Gly	Thr	Ile	Asp	Thr	Met	
		835					840					845				
tta	ggg	act	gcc	tct	acc	ctt	acc	cat	gaa	gtc	ggg	gca	gcg	gcg	ggg	2592
Leu	Gly	Thr	Ala	Ser	Thr	Leu	Thr	His	Glu	Val	Gly	Ala	Ala	Ala	Gly	
	850					855					860					
ggg	gcg	gcg	ggg	ggg	atg	atc	acc	ggg	acg	caa	ggg	agt	act	cgg	gca	2640
Gly	Ala	Ala	Gly	Gly	Met	Ile	Thr	Gly	Thr	Gln	Gly	Ser	Thr	Arg	Ala	
865					870					875					880	
ggg	atc	cat	gcc	ggg	att	ggc	acc	tat	tat	ggc	tcc	tgg	att	ggg	ttt	2688
Gly	Ile	His	Ala	Gly	Ile	Gly	Thr	Tyr	Tyr	Gly	Ser	Trp	Ile	Gly	Phe	
				885					890					895		
ggg	tta	gat	gtc	gct	agt	aac	ccc	gcc	gga	cat	tta	gcg	aat	tac	gca	2736
Gly	Leu	Asp	Val	Ala	Ser	Asn	Pro	Ala	Gly	His	Leu	Ala	Asn	Tyr	Ala	
			900					905					910			
gtg	ggg	tat	gcc	gct	ggg	ttg	ggg	gct	gaa	atg	gct	gtc	aac	aga	ata	2784
Val	Gly	Tyr	Ala	Ala	Gly	Leu	Gly	Ala	Glu	Met	Ala	Val	Asn	Arg	Ile	

915	920	925	
atg ggt ggt gga ttt ttg agt agg ctc tta ggc cgg gtt gtc agc cca			2832
Met Gly Gly Gly Phe Leu Ser Arg Leu Leu Gly Arg Val Val Ser Pro			
930	935	940	
tat gcc gcc ggt tta gcc aga caa tta gta cat ttc agt gtc gcc aga			2880
Tyr Ala Ala Gly Leu Ala Arg Gln Leu Val His Phe Ser Val Ala Arg			
945	950	955	960
cct gtc ttt gag ccg ata ttt agt gtt ctc ggc ggg ctt gtc ggt ggt			2928
Pro Val Phe Glu Pro Ile Phe Ser Val Leu Gly Gly Leu Val Gly Gly			
965	970	975	
att gga act ggc ctg cac aga gtg atg gga aga gag agt tgg att tcc			2976
Ile Gly Thr Gly Leu His Arg Val Met Gly Arg Glu Ser Trp Ile Ser			
980	985	990	
aga gcg tta agt gct gcc ggt agt ggt ata gat cat gtc gct ggc atg			3024
Arg Ala Leu Ser Ala Ala Gly Ser Gly Ile Asp His Val Ala Gly Met			
995	1000	1005	
att ggt aat cag atc aga ggc agg gtc ttg acc aca acc ggg atc			3069
Ile Gly Asn Gln Ile Arg Gly Arg Val Leu Thr Thr Thr Gly Ile			
1010	1015	1020	
gct aat gcg ata gac tat ggc acc agt gct gtg gga gcc gca cga			3114
Ala Asn Ala Ile Asp Tyr Gly Thr Ser Ala Val Gly Ala Ala Arg			
1025	1030	1035	
cga gtt ttt tct ttg taa			3132
Arg Val Phe Ser Leu			
1040			

<210> 26
 <211> 77
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Forward primer used to amplify TccC1 from the pBC KS+ vector.

<400> 26	
gtcgacgcac tactagtaaa aaggagataa ccccatgagc ccgtctgaga ctactcttta	60
tactcaaacc ccaacag	77

<210> 27
 <211> 57
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Reverse primer used to amplify TccC1 from the pBC KS+ vector.

<400> 27
 cggccgcagt cctcgagtca gattaattac aaagaaaaaa ctgcgtcgtgc ggctccc 57

<210> 28
 <211> 84
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Forward primer used to amplify XptA2.

<400> 28
 gtctagacgt gcgtcgacaa gaaggagata taccatgtat agcacggctg tattactcaa 60
 taaaatcagt cccactcgcg acgg 84

<210> 29
 <211> 64
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Reverse primer used to amplify XptA2.

<400> 29
 gctcgagatt aattaagaac gaatggtata gcggatatgc agaatgatat cgctcaggct 60
 ctcc 64

<210> 30
 <211> 81
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Forward primer used to amplify XptC1.

<400> 30
 gtctagacgt gcgtcgacaa gaaggagata taccatgcag ggttcaacac ctttgaaact 60
 tgaaataccg tcattgcct c 81

<210> 31
 <211> 64
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Reverse primer used to amplify XptC1.

<400> 31
 gactcgagag cattaattat gctgtcattt caccggcagt gtcattttca tcttcattca 60

ccac

64

<210> 32
 <211> 86
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Forward primer used to amplify XptB1.

<400> 32
 gtctagacgt gcgtcgacaa gaaggagata taccatgaag aatttcgttc acagcaatac 60
 gccatccgtc accgtactgg acaacc 86

<210> 33
 <211> 66
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Reverse primer used to amplify XptB1.

<400> 33
 gctcgagcag attaattatg cttcggattc attatgacgt gcagaggcgt taaagaagaa 60
 gttatt 66

<210> 34
 <211> 2538
 <212> PRT
 <213> Xenorhabdus nematophilus

<400> 34

Met Tyr Ser Thr Ala Val Leu Leu Asn Lys Ile Ser Pro Thr Arg Asp
 1 5 10 15

Gly Gln Thr Met Thr Leu Ala Asp Leu Gln Tyr Leu Ser Phe Ser Glu
 20 25 30

Leu Arg Lys Ile Phe Asp Asp Gln Leu Ser Trp Gly Glu Ala Arg His
 35 40 45

Leu Tyr His Glu Thr Ile Glu Gln Lys Lys Asn Asn Arg Leu Leu Glu
 50 55 60

Ala Arg Ile Phe Thr Arg Ala Asn Pro Gln Leu Ser Gly Ala Ile Arg
 65 70 75 80

Leu Gly Ile Glu Arg Asp Ser Val Ser Arg Ser Tyr Asp Glu Met Phe
 85 90 95

Gly Ala Arg Ser Ser Ser Phe Val Lys Pro Gly Ser Val Ala Ser Met
 100 105 110

Phe Ser Pro Ala Gly Tyr Leu Thr Glu Leu Tyr Arg Glu Ala Lys Asp
 115 120 125

Leu His Phe Ser Ser Ser Ala Tyr His Leu Asp Asn Arg Arg Pro Asp
 130 135 140

Leu Ala Asp Leu Thr Leu Ser Gln Ser Asn Met Asp Thr Glu Ile Ser
 145 150 155 160

Thr Leu Thr Leu Ser Asn Glu Leu Leu Leu Glu His Ile Thr Arg Lys
 165 170 175

Thr Gly Gly Asp Ser Asp Ala Leu Met Glu Ser Leu Ser Thr Tyr Arg
 180 185 190

Gln Ala Ile Asp Thr Pro Tyr His Gln Pro Tyr Glu Thr Ile Arg Gln
 195 200 205

Val Ile Met Thr His Asp Ser Thr Leu Ser Ala Leu Ser Arg Asn Pro
 210 215 220

Glu Val Met Gly Gln Ala Glu Gly Ala Ser Leu Leu Ala Ile Leu Ala
 225 230 235 240

Asn Ile Ser Pro Glu Leu Tyr Asn Ile Leu Thr Glu Glu Ile Thr Glu
 245 250 255

Lys Asn Ala Asp Ala Leu Phe Ala Gln Asn Phe Ser Glu Asn Ile Thr
 260 265 270

Pro Glu Asn Phe Ala Ser Gln Ser Trp Ile Ala Lys Tyr Tyr Gly Leu
 275 280 285

Glu Leu Ser Glu Val Gln Lys Tyr Leu Gly Met Leu Gln Asn Gly Tyr
 290 295 300

Ser Asp Ser Thr Ser Ala Tyr Val Asp Asn Ile Ser Thr Gly Leu Val
305 310 315 320

Val Asn Asn Glu Ser Lys Leu Glu Ala Tyr Lys Ile Thr Arg Val Lys
325 330 335

Thr Asp Asp Tyr Asp Lys Asn Ile Asn Tyr Phe Asp Leu Met Tyr Glu
340 345 350

Gly Asn Asn Gln Phe Phe Ile Arg Ala Asn Phe Lys Val Ser Arg Glu
355 360 365

Phe Gly Ala Thr Leu Arg Lys Asn Ala Gly Pro Ser Gly Ile Val Gly
370 375 380

Ser Leu Ser Gly Pro Leu Ile Ala Asn Thr Asn Phe Lys Ser Asn Tyr
385 390 395 400

Leu Ser Asn Ile Ser Asp Ser Glu Tyr Lys Asn Gly Val Lys Ile Tyr
405 410 415

Ala Tyr Arg Tyr Thr Ser Ser Thr Ser Ala Thr Asn Gln Gly Gly Gly
420 425 430

Ile Phe Thr Phe Glu Ser Tyr Pro Leu Thr Ile Phe Ala Leu Lys Leu
435 440 445

Asn Lys Ala Ile Arg Leu Cys Leu Thr Ser Gly Leu Ser Pro Asn Glu
450 455 460

Leu Gln Thr Ile Val Arg Ser Asp Asn Ala Gln Gly Ile Ile Asn Asp
465 470 475 480

Ser Val Leu Thr Lys Val Phe Tyr Thr Leu Phe Tyr Ser His Arg Tyr
485 490 495

Ala Leu Ser Phe Asp Asp Ala Gln Val Leu Asn Gly Ser Val Ile Asn
500 505 510

Gln Tyr Ala Asp Asp Asp Ser Val Ser His Phe Asn Arg Leu Phe Asn
515 520 525

Thr Pro Pro Leu Lys Gly Lys Ile Phe Glu Ala Asp Gly Asn Thr Val

530		535		540
Ser Ile Asp Pro Asp Glu Glu Gln Ser Thr Phe Ala Arg Ser Ala Leu				
545		550		555 560
Met Arg Gly Leu Gly Val Asn Ser Gly Glu Leu Tyr Gln Leu Gly Lys				
	565		570	575
Leu Ala Gly Val Leu Asp Ala Gln Asn Thr Ile Thr Leu Ser Val Phe				
	580		585	590
Val Ile Ser Ser Leu Tyr Arg Leu Thr Leu Leu Ala Arg Val His Gln				
	595		600	605
Leu Thr Val Asn Glu Leu Cys Met Leu Tyr Gly Leu Ser Pro Phe Asn				
	610		615	620
Gly Lys Thr Thr Ala Ser Leu Ser Ser Gly Glu Leu Pro Arg Leu Val				
	625		630	635 640
Ile Trp Leu Tyr Gln Val Thr Gln Trp Leu Thr Glu Ala Glu Ile Thr				
	645		650	655
Thr Glu Ala Ile Trp Leu Leu Cys Thr Pro Glu Phe Ser Gly Asn Ile				
	660		665	670
Ser Pro Glu Ile Ser Asn Leu Leu Asn Asn Leu Arg Pro Ser Ile Ser				
	675		680	685
Glu Asp Met Ala Gln Ser His Asn Arg Glu Leu Gln Ala Glu Ile Leu				
	690		695	700
Ala Pro Phe Ile Ala Ala Thr Leu His Leu Ala Ser Pro Asp Met Ala				
	705		710	715 720
Arg Tyr Ile Leu Leu Trp Thr Asp Asn Leu Arg Pro Gly Gly Leu Asp				
	725		730	735
Ile Ala Gly Phe Met Thr Leu Val Leu Lys Glu Ser Leu Asn Ala Asn				
	740		745	750
Glu Thr Thr Gln Leu Val Gln Phe Cys His Val Met Ala Gln Leu Ser				
	755		760	765

Leu Ser Val Gln Thr Leu Arg Leu Ser Glu Ala Glu Leu Ser Val Leu
 770 775 780

Val Ile Ser Gly Phe Ala Val Leu Gly Ala Lys Asn Gln Pro Ala Gly
 785 790 795 800

Gln His Asn Ile Asp Thr Leu Phe Ser Leu Tyr Arg Phe His Gln Trp
 805 810 815

Ile Asn Gly Leu Gly Asn Pro Gly Ser Asp Thr Leu Asp Met Leu Arg
 820 825 830

Gln Gln Thr Leu Thr Ala Asp Arg Leu Ala Ser Val Met Gly Leu Asp
 835 840 845

Ile Ser Met Val Thr Gln Ala Met Val Ser Ala Gly Val Asn Gln Leu
 850 855 860

Gln Cys Trp Gln Asp Ile Asn Thr Val Leu Gln Trp Ile Asp Val Ala
 865 870 875 880

Ser Ala Leu His Thr Met Pro Ser Val Ile Arg Thr Leu Val Asn Ile
 885 890 895

Arg Tyr Val Thr Ala Leu Asn Lys Ala Glu Ser Asn Leu Pro Ser Trp
 900 905 910

Asp Glu Trp Gln Thr Leu Ala Glu Asn Met Glu Ala Gly Leu Ser Thr
 915 920 925

Gln Gln Ala Gln Thr Leu Ala Asp Tyr Thr Ala Glu Arg Leu Ser Ser
 930 935 940

Val Leu Cys Asn Trp Phe Leu Ala Asn Ile Gln Pro Glu Gly Val Ser
 945 950 955 960

Leu His Ser Arg Asp Asp Leu Tyr Ser Tyr Phe Leu Ile Asp Asn Gln
 965 970 975

Val Ser Ser Ala Ile Lys Thr Thr Arg Leu Ala Glu Ala Ile Ala Gly
 980 985 990

Ile Gln Leu Tyr Ile Asn Arg Ala Leu Asn Arg Ile Glu Pro Asn Ala
 995 1000 1005

Arg Ala Asp Val Ser Thr Arg Gln Phe Phe Thr Asp Trp Thr Val
 1010 1015 1020

Asn Asn Arg Tyr Ser Thr Trp Gly Gly Val Ser Arg Leu Val Tyr
 1025 1030 1035

Tyr Pro Glu Asn Tyr Ile Asp Pro Thr Gln Arg Ile Gly Gln Thr
 1040 1045 1050

Arg Met Met Asp Glu Leu Leu Glu Asn Ile Ser Gln Ser Lys Leu
 1055 1060 1065

Ser Arg Asp Thr Val Glu Asp Ala Phe Lys Thr Tyr Leu Thr Arg
 1070 1075 1080

Phe Glu Thr Val Ala Asp Leu Lys Val Val Ser Ala Tyr His Asp
 1085 1090 1095

Asn Val Asn Ser Asn Thr Gly Leu Thr Trp Phe Val Gly Gln Thr
 1100 1105 1110

Arg Glu Asn Leu Pro Glu Tyr Tyr Trp Arg Asn Val Asp Ile Ser
 1115 1120 1125

Arg Met Gln Ala Gly Glu Leu Ala Ala Asn Ala Trp Lys Glu Trp
 1130 1135 1140

Thr Lys Ile Asp Thr Ala Val Asn Pro Tyr Lys Asp Ala Ile Arg
 1145 1150 1155

Pro Val Ile Phe Arg Glu Arg Leu His Leu Ile Trp Val Glu Lys
 1160 1165 1170

Glu Glu Val Ala Lys Asn Gly Thr Asp Pro Val Glu Thr Tyr Asp
 1175 1180 1185

Arg Phe Thr Leu Lys Leu Ala Phe Leu Arg His Asp Gly Ser Trp
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Glu Asn	Asn Tyr Tyr Ala Arg	Leu Phe Glu Phe Pro	Phe Ser Pro	
1445		1450		1455
Asn Thr	Ile Leu Asn Thr Val	Phe Thr Val Gly Ser	Asn Lys Thr	
1460		1465		1470
Ser Asp	Phe Lys Lys Cys Ser	Tyr Ala Val Asp Gly	Asn Asn Ser	
1475		1480		1485
Gln Gly	Phe Gln Ile Phe Ser	Ser Tyr Gln Ser Ser	Gly Trp Leu	
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Asp Ile	Asp Thr Gly Ile Asn	Asn Thr Asp Ile Lys	Ile Thr Val	
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Met Ala	Gly Ser Lys Thr His	Thr Phe Thr Ala Ser	Asp His Ile	
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Ala Ser	Leu Pro Ala Asn Ser	Phe Asp Ala Met Pro	Tyr Thr Phe	
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Lys Pro	Leu Glu Ile Asp Ala	Ser Ser Leu Ala Phe	Thr Asn Asn	
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Ile Ala	Pro Leu Asp Ile Val	Phe Glu Thr Lys Ala	Lys Asp Gly	
1565		1570		1575
Arg Val	Leu Gly Lys Ile Lys	Gln Thr Leu Ser Val	Lys Arg Val	
1580		1585		1590
Asn Tyr	Asn Pro Glu Asp Ile	Leu Phe Leu Arg Glu	Thr His Ser	
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Gly Ala	Gln Tyr Met Gln Leu	Gly Val Tyr Arg Ile	Arg Leu Asn	
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Thr Leu	Leu Ala Ser Gln Leu	Val Ser Arg Ala Asn	Thr Gly Ile	
1625		1630		1635

Asp Thr	Ile Leu Thr Met Glu	Thr Gln Arg Leu Pro	Glu Pro Pro
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Leu Gly	Glu Gly Phe Phe Ala	Asn Phe Val Leu Pro	Lys Tyr Asp
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Pro Ala	Glu His Gly Asp Glu	Arg Trp Phe Lys Ile	His Ile Gly
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Asn Val	Gly Gly Asn Thr Gly	Arg Gln Pro Tyr Tyr	Ser Gly Met
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Leu Ser	Asp Thr Ser Glu Thr	Ser Met Thr Leu Phe	Val Pro Tyr
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Ala Glu	Gly Tyr Tyr Met His	Glu Gly Val Arg Leu	Gly Val Gly
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Tyr Gln	Lys Ile Thr Tyr Asp	Asn Thr Trp Glu Ser	Ala Phe Phe
1730	1735	1740	
Tyr Phe	Asp Glu Thr Lys Gln	Gln Phe Val Leu Ile	Asn Asp Ala
1745	1750	1755	
Asp His	Asp Ser Gly Met Thr	Gln Gln Gly Ile Val	Lys Asn Ile
1760	1765	1770	
Lys Lys	Tyr Lys Gly Phe Leu	Asn Val Ser Ile Ala	Thr Gly Tyr
1775	1780	1785	
Ser Ala	Pro Met Asp Phe Asn	Ser Ala Ser Ala Leu	Tyr Tyr Trp
1790	1795	1800	
Glu Leu	Phe Tyr Tyr Thr Pro	Met Met Cys Phe Gln	Arg Leu Leu
1805	1810	1815	
Gln Glu	Lys Gln Phe Asp Glu	Ala Thr Gln Trp Ile	Asn Tyr Val
1820	1825	1830	
Tyr Asn	Pro Ala Gly Tyr Ile	Val Asn Gly Glu Ile	Ala Pro Trp
1835	1840	1845	

Ile	Trp	Asn	Cys	Arg	Pro	Leu	Glu	Glu	Thr	Thr	Ser	Trp	Asn	Ala
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Asn	Pro	Leu	Asp	Ala	Ile	Asp	Pro	Asp	Ala	Val	Ala	Gln	Asn	Asp
1865						1870					1875			
Pro	Met	His	Tyr	Lys	Ile	Ala	Thr	Phe	Met	Arg	Leu	Leu	Asp	Gln
1880						1885					1890			
Leu	Ile	Leu	Arg	Gly	Asp	Met	Ala	Tyr	Arg	Glu	Leu	Thr	Arg	Asp
1895						1900					1905			
Ala	Leu	Asn	Glu	Ala	Lys	Met	Trp	Tyr	Val	Arg	Thr	Leu	Glu	Leu
1910						1915					1920			
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1925						1930					1935			
Pro	Ser	Leu	Ser	Gly	Ala	Ala	Ser	Gln	Thr	Val	Gln	Ala	Ala	Tyr
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Leu	Arg	Thr	Ala	Asn	Ser	Leu	Val	Gly	Leu	Phe	Leu	Pro	Glu	Tyr
1970						1975					1980			
Asn	Pro	Ala	Leu	Thr	Asp	Tyr	Trp	Gln	Thr	Leu	Arg	Leu	Arg	Leu
1985						1990					1995			
Phe	Asn	Leu	Arg	His	Asn	Leu	Ser	Ile	Asp	Gly	Gln	Pro	Leu	Ser
2000						2005					2010			
Leu	Ala	Ile	Tyr	Ala	Glu	Pro	Thr	Asp	Pro	Lys	Ala	Leu	Leu	Thr
2015						2020					2025			
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2045						2050					2055			

Asn	Leu	Val	Ala	Gln	Leu	Thr	Gln	Phe	Gly	Thr	Ser	Leu	Leu	Ser
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Gln	Gln	Gly	Met	Glu	Leu	Ala	Thr	Gln	Ser	Ile	Arg	Ile	Gln	Gln
2090						2095					2100			
Arg	Thr	Val	Asp	Glu	Val	Asp	Ala	Asp	Ile	Ala	Val	Leu	Ala	Glu
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Tyr	Asp	Glu	Asp	Ile	Asn	His	Gly	Glu	Gln	Arg	Ala	Met	Ser	Leu
2135						2140					2145			
Leu	Asp	Ala	Ala	Ala	Gly	Gln	Ser	Leu	Ala	Gly	Gln	Val	Leu	Ser
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Ile	Ala	Glu	Gly	Val	Ala	Asp	Leu	Val	Pro	Asn	Val	Phe	Gly	Leu
2165						2170					2175			
Ala	Cys	Gly	Gly	Ser	Arg	Trp	Gly	Ala	Ala	Leu	Arg	Ala	Ser	Ala
2180						2185					2190			
Ser	Val	Met	Ser	Leu	Ser	Ala	Thr	Ala	Ser	Gln	Tyr	Ser	Ala	Asp
2195						2200					2205			
Lys	Ile	Ser	Arg	Ser	Glu	Ala	Tyr	Arg	Arg	Arg	Arg	Gln	Glu	Trp
2210						2215					2220			
Glu	Ile	Gln	Arg	Asp	Asn	Ala	Asp	Gly	Glu	Val	Lys	Gln	Met	Asp
2225						2230					2235			
Ala	Gln	Leu	Glu	Ser	Leu	Lys	Ile	Arg	Arg	Glu	Ala	Ala	Gln	Met
2240						2245					2250			
Gln	Val	Glu	Tyr	Gln	Glu	Thr	Gln	Gln	Ala	His	Thr	Gln	Ala	Gln
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Glu Leu Thr Asp Asn Gly Val	Thr Phe Ile Arg Gly Gly Ala Trp			
2315	2320	2325		
Asn Gly Thr Thr Ala Gly Leu	Met Ala Gly Glu Thr Leu Leu Leu			
2330	2335	2340		
Asn Leu Ala Glu Met Glu Lys	Val Trp Leu Glu Arg Asp Glu Arg			
2345	2350	2355		
Ala Leu Glu Val Thr Arg Thr	Val Ser Leu Ala Gln Phe Tyr Gln			
2360	2365	2370		
Ala Leu Ser Ser Asp Asn Phe	Asn Leu Thr Glu Lys Leu Thr Gln			
2375	2380	2385		
Phe Leu Arg Glu Gly Lys Gly	Asn Val Gly Ala Ser Gly Asn Glu			
2390	2395	2400		
Leu Lys Leu Ser Asn Arg Gln	Ile Glu Ala Ser Val Arg Leu Ser			
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Asp Leu Lys Ile Phe Ser Asp	Tyr Pro Glu Ser Leu Gly Asn Thr			
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Arg Gln Leu Lys Gln Val Ser	Val Thr Leu Pro Ala Leu Val Gly			
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Pro Tyr Glu Asp Ile Arg Ala	Val Leu Asn Tyr Gly Gly Ser Ile			
2450	2455	2460		
Val Met Pro Arg Gly Cys Ser	Ala Ile Ala Leu Ser His Gly Val			
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Asn Asp Ser Gly Gln Phe Met	Leu Asp Phe Asn Asp Ser Arg Tyr			
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Asp Ile Val Ser Asp Asn Leu Ala Glu Phe Gln Lys Asn Asn Pro Glu
 35 40 45

Ile Pro Ser Ser Asp Ala Lys Glu Ile His Gln Leu Ala Val Gln Arg
 50 55 60

Thr Glu Asn Leu Cys Met Leu Tyr Lys Ala Trp Gln Leu His Asn Asp
 65 70 75 80

Pro Val Val Gln Ser Leu Pro Lys Leu Ser Ala Asp Thr Gly Leu Gln
 85 90 95

Gly Met Arg Ala Ala Leu Glu Arg Ser Leu Gly Gly Gly Ala Asp Phe
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Gly Asp Leu Phe Pro Glu Arg Ser Pro Glu Gly Tyr Ala Glu Ala Ser
 115 120 125

Ser Ile Gln Ser Leu Phe Ser Pro Gly Arg Tyr Leu Thr Val Leu Tyr

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Cys Leu Met Ile Asn Arg Gly Thr Gly Ser Met Pro Ser Gly Thr His
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Leu Pro Val Gln Ile Glu Arg Val Thr Asp Thr Ser Ile Arg Ile Phe
385 390 395 400

Val Pro Asp His Gly Tyr Leu Gly Leu Gly Glu Ser Leu Ala Ser Asn
405 410 415

Trp Asn Glu Pro Leu Ala Leu Asn Leu Gly Leu Asp Glu Ala Leu Thr
420 425 430

Phe Thr Leu Arg Lys Lys Glu Thr Gly Asn Asp Thr Ile Ser Ile Ile
435 440 445

Asp Met Leu Pro Pro Val Ala Asn Thr Thr Pro Ser Pro Pro Thr Arg
450 455 460

Glu Thr Leu Ser Leu Thr Pro Asn Ser Phe Arg Leu Leu Val Asn Pro
465 470 475 480

Glu Pro Thr Ala Glu Asp Ile Ala Lys His Tyr Asn Val Thr Thr Val
485 490 495

Thr Arg Ala Pro Ala Asp Leu Ala Ser Ala Leu Asn Val Val Asp Asp
500 505 510

Phe Cys Leu Lys Thr Gly Leu Ser Phe Asn Glu Leu Leu Asp Leu Thr
515 520 525

Met Gln Lys Asp Tyr Gln Ser Lys Ser Ser Glu Tyr Lys Ser Arg Phe
530 535 540

Val Lys Phe Gly Gly Gly Glu Asn Val Pro Val Ser Ser Tyr Gly Ala
545 550 555 560

Ala Phe Leu Thr Gly Ala Glu Asp Thr Pro Leu Trp Val Lys Gln Tyr
565 570 575

Asn Ser Val Gly Thr Ala Thr Ser Thr Pro Val Leu Asn Phe Thr Pro
580 585 590

Asp Asn Val Val Ala Leu Ala Gly Arg Ala Glu Lys Leu Val Arg Leu
595 600 605

Met Arg Ser Thr Gly Leu Ser Phe Glu Gln Leu Asp Trp Leu Ile Ala
610 615 620

Asn Ala Ser Arg Ala Val Ile Glu His Gly Gly Glu Leu Phe Leu Asp
625 630 635 640

Lys Pro Val Leu Glu Ala Val Ala Glu Phe Thr Arg Leu Asn Lys Arg
645 650 655

Tyr Gly Val Thr Ser Asp Met Phe Ala Ala Phe Ile Gly Glu Val Asn
660 665 670

Thr Tyr Thr Glu Ala Gly Lys Asp Ser Phe Tyr Gln Ala Ser Phe Ser
675 680 685

Thr Ala Asp His Ser Ala Thr Leu Pro Leu Gly Ala Ser Leu Gln Leu
690 695 700

Glu Val Ser Lys Gln Asp Arg Tyr Glu Ala Ile Cys Cys Gly Ala Met
705 710 715 720

Gly Val Thr Ala Asp Glu Phe Ser Arg Ile Gly Lys Tyr Cys Phe Gly
725 730 735

Asp Lys Ala Gln Gln Ile Thr Ala Asn Glu Thr Thr Val Ala Gln Leu
740 745 750

Tyr Arg Leu Gly Arg Ile Pro His Met Leu Gly Leu Arg Phe Thr Glu
755 760 765

Ala Glu Leu Leu Trp Lys Leu Met Ala Gly Gly Glu Asp Thr Leu Leu
770 775 780

Arg Thr Ile Gly Ala Asn Pro Arg Ser Leu Glu Ala Leu Glu Ile Ile
785 790 795 800

Arg Arg Thr Glu Val Leu Leu Asp Trp Met Asp Ala His Gln Leu Asp
805 810 815

Val Val Ser Leu Gln Ala Met Val Thr Asn Arg Tyr Ser Gly Thr Ala
820 825 830

Thr Pro Glu Leu Tyr Asn Phe Leu Ala Gln Val His Gln Ser Ala Ser
835 840 845

Ser Ala Ala Asn Val Ala Arg Ala Asp Gly Gln Asp Thr Leu Pro Ala
850 855 860

Asp Lys Leu Leu Arg Ala Leu Ala Ala Gly Phe Lys Leu Lys Ala Asn
865 870 875 880

Val Met Ala Arg Val Ile Asp Trp Met Asp Lys Thr Asn Lys Ala Phe
885 890 895

Thr Leu Arg Ala Phe Trp Asp Lys Leu Gln Ala Tyr Phe Ser Ala Asp
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His Glu Glu Glu Leu Thr Ala Leu Glu Gly Glu Ala Ala Met Leu Gln
915 920 925

Trp Cys Gln Gln Ile Ser Gln Tyr Ala Leu Ile Val Arg Trp Cys Gly
930 935 940

Leu Ser Glu Gln Asp Leu Ala Leu Leu Thr Gly Asn Pro Glu Gln Leu
945 950 955 960

Leu Asp Gly Gln His Thr Val Pro Val Pro Ser Leu His Leu Leu Leu
965 970 975

Val Leu Thr Arg Leu Lys Glu Trp Gln Gln Arg Val Gln Val Ser Ser
980 985 990

Glu Glu Ala Met Arg Tyr Phe Ala Gln Ala Asp Ser Pro Thr Val Thr
995 1000 1005

Arg Asp Asp Ala Val Asn Leu Leu Ala Arg Ile His Gly Trp Asn
1010 1015 1020

Glu Ala Asp Thr Val Ser Met Asn Asp Tyr Leu Leu Gly Glu Asn
1025 1030 1035

Glu Tyr Pro Lys Asn Phe Asp Gln Ile Phe Ala Leu Glu Ser Trp

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 <211> 1208
 <212> PRT
 <213> Paenibacillus strain DAS1529

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Asn Gln Val Pro Thr Ala Leu Ala Asp Lys Ile Thr Asp Ala Asp Ser
35 40 45

Leu Tyr Glu Tyr Leu Leu Leu Asp Thr Lys Ile Ser Glu Leu Val Lys
50 55 60

Thr Ser Pro Ile Ala Glu Ala Ile Ser Ser Val Gln Leu Tyr Met Asn
65 70 75 80

Arg Cys Val Glu Gly Tyr Glu Gly Lys Leu Thr Pro Glu Ser Asn Thr
85 90 95

His Phe Gly Pro Gly Lys Phe Leu Tyr Asn Trp Asp Thr Tyr Asn Lys
 100 105 110

Arg Phe Ser Thr Trp Ala Gly Lys Glu Arg Leu Lys Tyr Tyr Ala Gly
 115 120 125

Ser Tyr Ile Glu Pro Ser Leu Arg Tyr Asn Lys Thr Asp Pro Phe Leu
 130 135 140

Asn Leu Glu Gln Ser Ile Ser Gln Gly Arg Ile Thr Asp Asp Thr Val
 145 150 155 160

Lys Asn Ala Leu Gln His Tyr Leu Thr Glu Tyr Glu Val Leu Ala Asp
 165 170 175

Leu Asp Tyr Ile Ser Val Asn Lys Gly Gly Asp Glu Ser Val Leu Leu
 180 185 190

Phe Val Gly Arg Thr Lys Thr Val Pro Tyr Glu Tyr Tyr Trp Arg Arg
 195 200 205

Leu Leu Leu Lys Arg Asp Asn Asn Asn Lys Leu Val Pro Ala Val Trp
 210 215 220

Ser Gln Trp Lys Lys Ile Ser Ala Asn Ile Gly Glu Ala Val Asp Ser
 225 230 235 240

Tyr Val Val Pro Arg Trp His Lys Asn Arg Leu His Val Gln Trp Cys
 245 250 255

Ser Ile Glu Lys Ser Glu Asn Asp Ala Gly Glu Pro Ile Glu Lys Arg
 260 265 270

Tyr Leu Asn Asp Trp Phe Met Asp Ser Ser Gly Val Trp Ser Ser Phe
 275 280 285

Arg Lys Ile Pro Val Val Glu Lys Ser Phe Glu Tyr Leu Asp Gly Ser
 290 295 300

Leu Asp Pro Arg Phe Val Ala Leu Val Arg Asn Gln Ile Leu Ile Asp
 305 310 315 320

Glu Pro Glu Ile Phe Arg Ile Thr Val Ser Ala Pro Asn Pro Ile Asp

325

330

335

Ala Asn Gly Arg Val Glu Val His Phe Glu Glu Asn Tyr Ala Asn Arg
 340 345 350

Tyr Asn Ile Thr Ile Lys Tyr Gly Thr Thr Ser Leu Ala Ile Pro Ala
 355 360 365

Gly Gln Val Gly His Pro Asn Ile Ser Ile Asn Glu Thr Leu Arg Val
 370 375 380

Glu Phe Gly Thr Arg Pro Asp Trp Tyr Tyr Thr Phe Arg Tyr Leu Gly
 385 390 395 400

Asn Thr Ile Gln Asn Ser Tyr Gly Ser Ile Val Asn Asn Gln Phe Ser
 405 410 415

Pro Pro Ser Gly Ser Asn Ile Lys Gly Pro Ile Asp Leu Thr Leu Lys
 420 425 430

Asn Asn Ile Asp Leu Ser Ala Leu Leu Asp Glu Ser Leu Asp Ala Leu
 435 440 445

Phe Asp Tyr Thr Ile Gln Gly Asp Asn Gln Leu Gly Gly Leu Ala Ala
 450 455 460

Phe Asn Gly Pro Tyr Gly Leu Tyr Leu Trp Glu Ile Phe Phe His Val
 465 470 475 480

Pro Phe Leu Met Ala Val Arg Phe His Thr Glu Gln Arg Tyr Glu Leu
 485 490 495

Ala Glu Arg Trp Phe Lys Phe Ile Phe Asn Ser Ala Gly Tyr Arg Asp
 500 505 510

Asp Tyr Gly Ser Leu Leu Thr Asp Asp Lys Gly Asn Val Arg Tyr Trp
 515 520 525

Asn Val Ile Pro Leu Gln Glu Asp Thr Glu Trp Asp Asp Thr Leu Ser
 530 535 540

Leu Ala Thr Thr Asp Pro Asp Glu Ile Ala Met Ala Asp Pro Met Gln
 545 550 555 560

Tyr Lys Leu Ala Ile Phe Ile His Thr Met Asp Phe Leu Ile Ser Arg
565 570 575

Gly Asp Ser Leu Tyr Arg Met Leu Glu Arg Asp Thr Leu Ala Glu Ala
580 585 590

Lys Met Tyr Tyr Ile Gln Ala Ser Gln Leu Leu Gly Pro Arg Pro Asp
595 600 605

Ile Arg Leu Asn His Ser Trp Pro Asn Pro Thr Leu Gln Ser Glu Ala
610 615 620

Asp Ala Val Thr Ala Val Pro Thr Arg Ser Asp Ser Pro Ala Ala Pro
625 630 635 640

Ile Leu Ala Leu Arg Ala Leu Leu Thr Gly Glu Asn Gly His Phe Leu
645 650 655

Pro Pro Tyr Asn Asp Glu Leu Phe Ala Phe Trp Asp Lys Ile Asp Leu
660 665 670

Arg Leu Tyr Asn Leu Arg His Asn Leu Ser Leu Asp Gly Gln Pro Leu
675 680 685

His Leu Pro Leu Phe Ala Glu Pro Val Asn Pro Arg Glu Leu Gln Val
690 695 700

Gln His Gly Pro Gly Asp Gly Leu Gly Gly Ser Ala Gly Ser Ala Gln
705 710 715 720

Ser Arg Gln Ser Val Tyr Arg Phe Pro Leu Val Ile Asp Lys Ala Arg
725 730 735

Asn Ala Ala Asn Ser Val Ile Gln Phe Gly Asn Ala Leu Glu Asn Ala
740 745 750

Leu Thr Lys Gln Asp Ser Glu Ala Met Thr Met Leu Leu Gln Ser Gln
755 760 765

Gln Gln Ile Val Leu Gln Gln Thr Arg Asp Ile Gln Glu Lys Asn Leu
770 775 780

Ala Ala Leu Gln Ala Ser Leu Glu Ala Thr Met Thr Ala Lys Ala Gly
785 790 795 800

Ala Glu Ser Arg Lys Thr His Phe Ala Gly Leu Ala Asp Asn Trp Met
805 810 815

Ser Asp Asn Glu Thr Ala Ser Leu Ala Leu Arg Thr Thr Ala Gly Ile
820 825 830

Ile Asn Thr Ser Ser Thr Val Pro Ile Ala Ile Thr Gly Gly Leu Asp
835 840 845

Met Ala Pro Asn Ile Phe Gly Phe Ala Val Gly Gly Ser Arg Trp Gly
850 855 860

Ala Ala Ser Ala Ala Val Ala Gln Gly Leu Gln Ile Ala Ala Gly Val
865 870 875 880

Met Glu Gln Thr Ala Asn Ile Ile Asp Ile Ser Glu Ser Tyr Arg Arg
885 890 895

Arg Arg Glu Asp Trp Leu Leu Gln Arg Asp Val Ala Glu Asn Glu Ala
900 905 910

Ala Gln Leu Asp Ser Gln Ile Ala Ala Leu Arg Glu Gln Met Asp Met
915 920 925

Ala Arg Lys Gln Leu Ala Leu Ala Glu Thr Glu Gln Ala His Ala Gln
930 935 940

Ala Val Tyr Glu Leu Gln Ser Thr Arg Phe Thr Asn Gln Ala Leu Tyr
945 950 955 960

Asn Trp Met Ala Gly Arg Leu Ser Ser Leu Tyr Tyr Gln Met Tyr Asp
965 970 975

Ala Ala Leu Pro Leu Cys Leu Met Ala Lys Gln Ala Leu Glu Lys Glu
980 985 990

Ile Gly Ser Asp Lys Thr Val Gly Val Leu Ser Leu Pro Ala Trp Asn
995 1000 1005

Asp	Leu	Tyr	Gln	Gly	Leu	Leu	Ala	Gly	Glu	Ala	Leu	Leu	Leu	Glu
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Leu	Gln	Lys	Leu	Glu	Asn	Leu	Trp	Leu	Glu	Glu	Asp	Lys	Arg	Gly
1025						1030					1035			
Met	Glu	Ala	Val	Lys	Thr	Val	Ser	Leu	Asp	Thr	Leu	Leu	Arg	Lys
1040						1045					1050			
Thr	Asn	Pro	Asn	Ser	Gly	Phe	Ala	Asp	Leu	Val	Lys	Glu	Ala	Leu
1055						1060					1065			
Asp	Glu	Asn	Gly	Lys	Thr	Pro	Asp	Pro	Val	Ser	Gly	Val	Gly	Val
1070						1075					1080			
Gln	Leu	Gln	Asn	Asn	Ile	Phe	Ser	Ala	Thr	Leu	Asp	Leu	Ser	Val
1085						1090					1095			
Leu	Gly	Leu	Asp	Arg	Ser	Tyr	Asn	Gln	Ala	Glu	Lys	Ser	Arg	Arg
1100						1105					1110			
Ile	Lys	Asn	Met	Ser	Val	Thr	Leu	Pro	Ala	Leu	Leu	Gly	Pro	Tyr
1115						1120					1125			
Gln	Asp	Ile	Glu	Ala	Thr	Leu	Ser	Leu	Gly	Gly	Glu	Thr	Val	Ala
1130						1135					1140			
Leu	Ser	His	Gly	Val	Asp	Asp	Ser	Gly	Leu	Phe	Ile	Thr	Asp	Leu
1145						1150					1155			
Asn	Asp	Ser	Arg	Phe	Leu	Pro	Phe	Glu	Gly	Met	Asp	Pro	Leu	Ser
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1175						1180					1185			
Gln	Arg	Leu	Leu	Leu	Glu	Ser	Leu	Asn	Asp	Val	Ile	Phe	His	Ile
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<211> 4335

<212> DNA

<213> Paenibacillus strain DAS1529

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<212> PRT
<213> Paenibacillus strain DAS1529

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<400> 40

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Pro Lys Gly Gly Gly Ser Met Lys Gly Ile Glu Glu Asn Ile Ala Ala
20           25           30

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Pro Gly Ser Asp Gly Met Ala Arg Cys Asn Val Pro Leu Pro Val Thr
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Ser Gly Arg Tyr Ile Thr Pro Asp Ile Ser Leu Ser Tyr Ala Ser Gly
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His Gly Asn Gly Ala Tyr Gly Met Gly Trp Thr Met Gly Val Met Ser
65 70 75 80

Ile Ser Arg Arg Thr Ser Arg Gly Thr Pro Ser Tyr Thr Ser Glu Asp
85 90 95

Gln Phe Leu Gly Pro Asp Gly Glu Val Leu Val Pro Glu Ser Asn Glu
100 105 110

Gln Gly Glu Ile Ile Thr Arg His Thr Asp Thr Ala Gln Gly Ile Pro
115 120 125

Leu Gly Glu Thr Phe Thr Val Thr Arg Tyr Phe Pro Arg Ile Glu Ser
130 135 140

Ala Phe His Leu Leu Glu Tyr Trp Glu Ala Gln Ala Gly Ser Ala Thr
145 150 155 160

Ala Ser Phe Trp Leu Ile His Ser Ala Asp Gly Val Leu His Cys Leu
165 170 175

Gly Lys Thr Ala Gln Ala Arg Ile Ala Ala Pro Asp Asp Ser Ala Lys
180 185 190

Ile Ala Glu Trp Leu Val Glu Glu Ser Val Ser Pro Phe Gly Glu His
195 200 205

Ile Tyr Tyr Gln Tyr Lys Glu Glu Asp Asn Gln Gly Val Asn Leu Glu
210 215 220

Glu Asp Asn His Gln Tyr Gly Ala Asn Arg Tyr Leu Lys Ser Ile Arg
225 230 235 240

Tyr Gly Asn Lys Val Ala Ser Pro Ser Leu Tyr Val Trp Lys Gly Glu
245 250 255

Ile Pro Ala Asp Gly Gln Trp Leu Tyr Ser Val Ile Leu Asp Tyr Gly
260 265 270

Glu Asn Asp Thr Ser Ala Asp Val Pro Pro Leu Tyr Thr Pro Gln Gly

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290	295	300
Glu Val Arg Thr Cys Arg Leu Cys Arg Gln Val Leu Met Phe His Val		
305	310	315 320
Phe Lys Glu Leu Gly Gly Glu Pro Ala Leu Val Trp Arg Met Gln Leu		
325	330	335
Glu Tyr Asp Glu Asn Pro Ala Ala Ser Met Leu Ser Ala Val Arg Gln		
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Leu Ala Tyr Glu Ala Asp Gly Ala Ile Arg Ser Leu Pro Pro Leu Glu		
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Phe Asp Tyr Thr Pro Phe Gly Ile Glu Thr Thr Ala Asp Trp Gln Pro		
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Phe Leu Pro Val Pro Glu Trp Ala Asp Glu Glu His Tyr Gln Leu Val		
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Ala Tyr Asn Ser Trp Arg Pro Leu Pro His Ile Pro Val Asn Ser Arg		
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Ala Gly Phe Lys Arg Ala Cys Glu Val Trp Gln Gln Val Gly Ile Thr
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Leu Pro Val Glu Arg Val Asp Lys Lys Glu Leu Val Ala Phe Ser Asp
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Met Leu Gly Ser Gly Gln Ser His Leu Val Arg Ile Arg His Asp Gly
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Val Thr Cys Trp Pro Asn Leu Gly Asn Gly Val Phe Gly Ala Pro Leu
 580 585 590

Ala Leu His Gly Phe Thr Ala Ser Glu Arg Glu Phe Asn Pro Glu Arg
 595 600 605

Val Tyr Leu Val Asp Leu Asp Gly Ser Gly Ala Ser Asp Ile Ile Tyr
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Ala Ser Arg Asp Ala Leu Leu Ile Tyr Arg Asn Leu Ser Gly Asn Gly
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Phe Ala Asp Pro Val Arg Val Pro Leu Pro Asp Gly Val Arg Phe Asp
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Asn Leu Cys Arg Leu Leu Pro Ala Asp Ile Arg Gly Leu Gly Val Ala
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Ser Leu Val Leu His Val Pro Tyr Met Ala Pro Arg Ser Trp Lys Leu
 675 680 685

Asp Phe Phe Ala Ala Lys Pro Tyr Leu Leu Gln Thr Val Ser Asn Asn
 690 695 700

Leu Gly Ala Ser Ser Ser Phe Trp Tyr Arg Ser Ser Thr Gln Tyr Trp
 705 710 715 720

Leu Asp Glu Lys Gln Ala Ala Ser Ser Ala Val Ser Ala Leu Pro Phe
 725 730 735

Pro Ile Asn Val Val Ser Asp Met His Thr Val Asp Glu Ile Ser Gly
740 745 750

Arg Thr Arg Thr Gln Lys Tyr Thr Tyr Arg His Gly Val Tyr Asp Arg
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Thr Glu Lys Glu Phe Ala Gly Phe Gly Arg Ile Asp Thr Trp Glu Glu
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Glu Arg Asp Ser Glu Gly Thr Leu Ser Val Ser Thr Pro Pro Val Leu
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Val Gln Gln Tyr Trp Gln Gly Asp Pro Ala Ala Phe Gln Val Lys Pro
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Val Arg Leu Thr Arg Phe Asp Ala Ala Ala Ala Gln Asp Leu Pro Leu
835 840 845

Asp Ser Asn Asn Gly Gln Gln Glu Tyr Trp Leu Tyr Arg Ser Leu Gln
850 855 860

Gly Met Pro Leu Arg Thr Glu Ile Phe Ala Gly Asp Val Gly Gly Ser
865 870 875 880

Pro Pro Tyr Gln Val Glu Ser Phe Arg Tyr Gln Val Arg Leu Val Gln
885 890 895

Ser Ile Asp Ser Glu Cys Val Ala Leu Pro Met Gln Leu Glu Gln Leu
900 905 910

Thr Tyr Asn Tyr Glu Gln Ile Ala Ser Asp Pro Gln Cys Ser Gln Gln
915 920 925

Ile Gln Gln Trp Phe Asp Glu Tyr Gly Val Ala Ala Gln Ser Val Thr
930 935 940

Ile Gln Tyr Pro Arg Arg Ala Gln Pro Glu Asp Asn Pro Tyr Pro Arg
945 950 955 960

Ala Ile Gln Ile Thr Asp Thr Asn Asn Asn Val Asn Gln Val Ala

1175		1180		1185
Leu Asp Ala Leu Gly Arg Val Val Tyr Ser Arg Thr Trp Gly Thr				
1190		1195		1200
Glu Glu Gly Ile Lys Thr Gly Phe Arg Pro Glu Val Glu Phe Ala				
1205		1210		1215
Thr Pro Glu Thr Met Glu Gln Ala Leu Ala Leu Ala Ser Pro Leu				
1220		1225		1230
Pro Val Ala Ser Cys Cys Val Tyr Asp Ala His Ser Trp Met Gly				
1235		1240		1245
Thr Ile Thr Leu Ala Gln Leu Ser Glu Leu Val Pro Asp Ser Glu				
1250		1255		1260
Lys Gln Trp Ser Phe Leu Ile Asp Asn Arg Leu Ile Met Pro Asp				
1265		1270		1275
Gly Arg Ile Arg Ser Arg Gly Arg Asp Pro Trp Ser Leu His Arg				
1280		1285		1290
Leu Leu Pro Pro Ala Val Gly Glu Leu Leu Ser Glu Ala Asp Arg				
1295		1300		1305
Lys Pro Pro His Thr Val Ile Leu Ala Ala Asp Arg Tyr Pro Asp				
1310		1315		1320
Asp Pro Ser Gln Gln Ile Gln Ala Ser Ile Val Phe Ser Asp Gly				
1325		1330		1335
Phe Gly Arg Thr Ile Gln Thr Ala Lys Arg Glu Asp Thr Arg Trp				
1340		1345		1350
Ala Ile Ala Glu Arg Val Asp Tyr Asp Gly Thr Gly Ala Val Ile				
1355		1360		1365
Arg Ser Phe Gln Pro Phe Tyr Leu Asp Asp Trp Asn Tyr Val Gly				
1370		1375		1380
Glu Glu Ala Val Ser Ser Ser Met Tyr Ala Thr Ile Tyr Tyr Tyr				
1385		1390		1395

Asp Ala Leu Ala Arg Gln Leu Arg Met Val Asn Ala Lys Gly Tyr
 1400 1405 1410

Glu Arg Arg Thr Ala Phe Tyr Pro Trp Phe Thr Val Asn Glu Asp
 1415 1420 1425

Glu Asn Asp Thr Met Asp Ser Ser Leu Phe Ala Ser Pro Pro Ala
 1430 1435 1440

Arg

<210> 41
 <211> 2793
 <212> DNA
 <213> Paenibacillus strain DAS1529

<400> 41
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 ttggagattc gcattcttca gtataaccgt atcgcggtcg aagatccggc agatgagtgt 120
 atcctgcgga acacgtatac gccgttaagc tatcttgga gcagcatgga tccccgtttg 180
 ttctcgcaat atcaggatga tcgcggaaca ccgccgaata tacgaaccat ggcttccctg 240
 agaggcgaag cgctgtgttc ggaaagtgtg gatgccggcc gcaaggcgga gctttttgat 300
 atcgaggggc ggcccgctg gcttatcgat gccaacggca cagagacgac tctcgatat 360
 gatgtcttag gcaggccaac agccgtattc gagcaacagg aaggtacgga ctccccccag 420
 tgcagggagc ggtttattta tgggtgagaag gaggcggatg cccaggccaa caatttgcgc 480
 ggacaactgg ttcgccacta cgataccgcg ggccgggatac agaccgacag catctccttg 540
 gctggactgc cgttgcgcca aagccgtcaa ctgctgaaaa attgggatga acctggcgac 600
 tggagtatgg atgaggaaag cgcctgggccc tcgttgctgg ctgccgaagc ttatgatacg 660
 agctggcggg atgacgcgca ggacagggtg ctgccccaaa ccgacgccaa agggaatctc 720
 cagcaactga cttacaatga cgccggccag ccgcaggcgg tcagcctcaa gctgcaaggc 780
 caagcggagc aacggatttg gaaccggatc gagtacaacg cggcgggtca agtggaatctc 840
 gccgaagccg ggaatggaat cgtaacggaa tatacttacg aggaaagcac gcagcgggta 900
 atccgaaaaa aagattcccg cggactgtcc tccggggaaa gagaagtgtc gcaggattat 960
 cgttatgaat atgatccggg aggcaatatc ctttctattt acaatgaagc ggagccgggt 1020

cgttattttcc gcaatcaggc cgttgctccg aaaaggcaat atgcctacga tgccttgtat	1080
cagcttgtat ctagttcggg gcgggaatcc gacgcgcttc ggcagcagac gtcgcttcct	1140
cccttgatca cgcctatccc tctggacgat agccaatacg tcaattacgc tgaaaaatac	1200
agctatgatc aggcgggcaa tttaatcaag cttagccata acggggcaag tcaatataca	1260
acgaatgtgt atgtggacaa aagctcaaac cgggggattt ggccggcaagg ggaagacatc	1320
ccggatatcg cggcttcctt tgacagagca ggcaatcaac aagctttatt cccggggaga	1380
ccgttggaat gggatacacg caatcaatta agccgtgtcc atatggctcg gcgcgaaggc	1440
ggagacaacg actgggaagg ctatctctat gacagctcgg gaatgcgtat cgtaaaacga	1500
tctaccgca aaacacagac aacgacgcaa acggatacga ccctctattt gccgggcctg	1560
gagctgcgaa tccgccagac cggggaccgg gtcacggaag cattgcaggt cattaccgtg	1620
gatgagggag cgggacaagt gagggtgctg cactgggagg atggaaccga gccgggcggc	1680
atcgccaatg atcagtaccg gtacagcctg aacgatcatc ttacctctc tttattggaa	1740
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ctgtggacag cccggtcaga ggtagaggca agctacaaga ccatccgcta ttcaggcaaa	1860
gagcgggatg ccacaggcct gtattattac ggacaccgct actatatgcc atggttgggg	1920
cgttggtga atccggaccc ggccggaatg gtagatggac taaacctgta ccgtatggtc	1980
aggaacaatc ctataggact gatggatccg aatgggaatg cgccaatcaa cgtggcggat	2040
tatagcttcg tgcattggtga tttagtttat ggtcttagta aggaaagagg aagatatcta	2100
aagctattta atccaaactt taatatggaa aaatcagact ctctgctat ggttatagat	2160
caatataata ataattgtgc attgagtata actaaccaat ataaagtaga agaattgatg	2220
aaatttcaaa aagaccaca aaaagccgca cggaaaataa aggttccaga agggaatcgt	2280
ttatcgagga acgaaaatta tcctttgtgg cacgattata ttaacattgg agaagctaaa	2340
gctgcattta aggcctctca tattttccaa gaagtgaagg ggaattatgg gaaagattat	2400
tatcataaat tattattaga cagaatgata gaatcgccgt tgctgtggaa acgaggcagc	2460
aaactcgggc tagaaatcgc cgctaccaat cagagaacaa aaatacactt tgttcttgac	2520
aatttaaata tcgagcaggt ggttacgaaa gagggtagcg gcggtcagtc aatcacagct	2580
tcggagctcc gttatatatta tcgaaatcgc gaaagattga acgggcgtgt cattttctat	2640
agaaataatg aaaggctaga tcaggctcca tggcaagaaa atccggactt atggagcaaa	2700

tatcaaccgg gtcttagaca aagcagcagt tcaagagtca aagaacgagg gattgggaac 2760

tttttccgcc ggttttcaat gaagagaaag tag 2793

<210> 42
 <211> 930
 <212> PRT
 <213> Paenibacillus strain DAS1529

<400> 42

Met Asn Thr Thr Ser Ile Tyr Arg Gly Thr Pro Thr Ile Ser Val Val
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Asp Asn Arg Asn Leu Glu Ile Arg Ile Leu Gln Tyr Asn Arg Ile Ala
 20 25 30

Ala Glu Asp Pro Ala Asp Glu Cys Ile Leu Arg Asn Thr Tyr Thr Pro
 35 40 45

Leu Ser Tyr Leu Gly Ser Ser Met Asp Pro Arg Leu Phe Ser Gln Tyr
 50 55 60

Gln Asp Asp Arg Gly Thr Pro Pro Asn Ile Arg Thr Met Ala Ser Leu
 65 70 75 80

Arg Gly Glu Ala Leu Cys Ser Glu Ser Val Asp Ala Gly Arg Lys Ala
 85 90 95

Glu Leu Phe Asp Ile Glu Gly Arg Pro Val Trp Leu Ile Asp Ala Asn
 100 105 110

Gly Thr Glu Thr Thr Leu Glu Tyr Asp Val Leu Gly Arg Pro Thr Ala
 115 120 125

Val Phe Glu Gln Gln Glu Gly Thr Asp Ser Pro Gln Cys Arg Glu Arg
 130 135 140

Phe Ile Tyr Gly Glu Lys Glu Ala Asp Ala Gln Ala Asn Asn Leu Arg
 145 150 155 160

Gly Gln Leu Val Arg His Tyr Asp Thr Ala Gly Arg Ile Gln Thr Asp
 165 170 175

Ser Ile Ser Leu Ala Gly Leu Pro Leu Arg Gln Ser Arg Gln Leu Leu

180

185

190

Lys Asn Trp Asp Glu Pro Gly Asp Trp Ser Met Asp Glu Glu Ser Ala
 195 200 205

Trp Ala Ser Leu Leu Ala Ala Glu Ala Tyr Asp Thr Ser Trp Arg Tyr
 210 215 220

Asp Ala Gln Asp Arg Val Leu Ala Gln Thr Asp Ala Lys Gly Asn Leu
 225 230 235 240

Gln Gln Leu Thr Tyr Asn Asp Ala Gly Gln Pro Gln Ala Val Ser Leu
 245 250 255

Lys Leu Gln Gly Gln Ala Glu Gln Arg Ile Trp Asn Arg Ile Glu Tyr
 260 265 270

Asn Ala Ala Gly Gln Val Asp Leu Ala Glu Ala Gly Asn Gly Ile Val
 275 280 285

Thr Glu Tyr Thr Tyr Glu Glu Ser Thr Gln Arg Leu Ile Arg Lys Lys
 290 295 300

Asp Ser Arg Gly Leu Ser Ser Gly Glu Arg Glu Val Leu Gln Asp Tyr
 305 310 315 320

Arg Tyr Glu Tyr Asp Pro Val Gly Asn Ile Leu Ser Ile Tyr Asn Glu
 325 330 335

Ala Glu Pro Val Arg Tyr Phe Arg Asn Gln Ala Val Ala Pro Lys Arg
 340 345 350

Gln Tyr Ala Tyr Asp Ala Leu Tyr Gln Leu Val Ser Ser Ser Gly Arg
 355 360 365

Glu Ser Asp Ala Leu Arg Gln Gln Thr Ser Leu Pro Pro Leu Ile Thr
 370 375 380

Pro Ile Pro Leu Asp Asp Ser Gln Tyr Val Asn Tyr Ala Glu Lys Tyr
 385 390 395 400

Ser Tyr Asp Gln Ala Gly Asn Leu Ile Lys Leu Ser His Asn Gly Ala
 405 410 415

Ser Gln Tyr Thr Thr Asn Val Tyr Val Asp Lys Ser Ser Asn Arg Gly
 420 425 430

Ile Trp Arg Gln Gly Glu Asp Ile Pro Asp Ile Ala Ala Ser Phe Asp
 435 440 445

Arg Ala Gly Asn Gln Gln Ala Leu Phe Pro Gly Arg Pro Leu Glu Trp
 450 455 460

Asp Thr Arg Asn Gln Leu Ser Arg Val His Met Val Val Arg Glu Gly
 465 470 475 480

Gly Asp Asn Asp Trp Glu Gly Tyr Leu Tyr Asp Ser Ser Gly Met Arg
 485 490 495

Ile Val Lys Arg Ser Thr Arg Lys Thr Gln Thr Thr Thr Gln Thr Asp
 500 505 510

Thr Thr Leu Tyr Leu Pro Gly Leu Glu Leu Arg Ile Arg Gln Thr Gly
 515 520 525

Asp Arg Val Thr Glu Ala Leu Gln Val Ile Thr Val Asp Glu Gly Ala
 530 535 540

Gly Gln Val Arg Val Leu His Trp Glu Asp Gly Thr Glu Pro Gly Gly
 545 550 555 560

Ile Ala Asn Asp Gln Tyr Arg Tyr Ser Leu Asn Asp His Leu Thr Ser
 565 570 575

Ser Leu Leu Glu Val Asp Gly Gln Gly Gln Ile Ile Ser Lys Glu Glu
 580 585 590

Phe Tyr Pro Tyr Gly Gly Thr Ala Leu Trp Thr Ala Arg Ser Glu Val
 595 600 605

Glu Ala Ser Tyr Lys Thr Ile Arg Tyr Ser Gly Lys Glu Arg Asp Ala
 610 615 620

Thr Gly Leu Tyr Tyr Tyr Gly His Arg Tyr Tyr Met Pro Trp Leu Gly
 625 630 635 640

Arg Trp Leu Asn Pro Asp Pro Ala Gly Met Val Asp Gly Leu Asn Leu
 645 650 655

Tyr Arg Met Val Arg Asn Asn Pro Ile Gly Leu Met Asp Pro Asn Gly
 660 665 670

Asn Ala Pro Ile Asn Val Ala Asp Tyr Ser Phe Val His Gly Asp Leu
 675 680 685

Val Tyr Gly Leu Ser Lys Glu Arg Gly Arg Tyr Leu Lys Leu Phe Asn
 690 695 700

Pro Asn Phe Asn Met Glu Lys Ser Asp Ser Pro Ala Met Val Ile Asp
 705 710 715 720

Gln Tyr Asn Asn Asn Val Ala Leu Ser Ile Thr Asn Gln Tyr Lys Val
 725 730 735

Glu Glu Leu Met Lys Phe Gln Lys Asp Pro Gln Lys Ala Ala Arg Lys
 740 745 750

Ile Lys Val Pro Glu Gly Asn Arg Leu Ser Arg Asn Glu Asn Tyr Pro
 755 760 765

Leu Trp His Asp Tyr Ile Asn Ile Gly Glu Ala Lys Ala Ala Phe Lys
 770 775 780

Ala Ser His Ile Phe Gln Glu Val Lys Gly Asn Tyr Gly Lys Asp Tyr
 785 790 795 800

Tyr His Lys Leu Leu Leu Asp Arg Met Ile Glu Ser Pro Leu Leu Trp
 805 810 815

Lys Arg Gly Ser Lys Leu Gly Leu Glu Ile Ala Ala Thr Asn Gln Arg
 820 825 830

Thr Lys Ile His Phe Val Leu Asp Asn Leu Asn Ile Glu Gln Val Val
 835 840 845

Thr Lys Glu Gly Ser Gly Gly Gln Ser Ile Thr Ala Ser Glu Leu Arg
 850 855 860

Tyr Ile Tyr Arg Asn Arg Glu Arg Leu Asn Gly Arg Val Ile Phe Tyr
865 870 875 880

Arg Asn Asn Glu Arg Leu Asp Gln Ala Pro Trp Gln Glu Asn Pro Asp
885 890 895

Leu Trp Ser Lys Tyr Gln Pro Gly Leu Arg Gln Ser Ser Ser Ser Arg
900 905 910

Val Lys Glu Arg Gly Ile Gly Asn Phe Phe Arg Arg Phe Ser Met Lys
915 920 925

Arg Lys
930

<210> 43
<211> 953
<212> PRT
<213> Paenibacillus strain DAS1529

<400> 43

Met Lys Met Ile Pro Trp Thr His His Tyr Leu Leu His Arg Leu Arg
1 5 10 15

Gly Glu Met Glu Val Lys Pro Met Asn Thr Thr Ser Ile Tyr Arg Gly
20 25 30

Thr Pro Thr Ile Ser Val Val Asp Asn Arg Asn Leu Glu Ile Arg Ile
35 40 45

Leu Gln Tyr Asn Arg Ile Ala Ala Glu Asp Pro Ala Asp Glu Cys Ile
50 55 60

Leu Arg Asn Thr Tyr Thr Pro Leu Ser Tyr Leu Gly Ser Ser Met Asp
65 70 75 80

Pro Arg Leu Phe Ser Gln Tyr Gln Asp Asp Arg Gly Thr Pro Pro Asn
85 90 95

Ile Arg Thr Met Ala Ser Leu Arg Gly Glu Ala Leu Cys Ser Glu Ser
100 105 110

Val Asp Ala Gly Arg Lys Ala Glu Leu Phe Asp Ile Glu Gly Arg Pro
115 120 125

Val Trp Leu Ile Asp Ala Asn Gly Thr Glu Thr Thr Leu Glu Tyr Asp
 130 135 140

Val Leu Gly Arg Pro Thr Ala Val Phe Glu Gln Gln Glu Gly Thr Asp
 145 150 155 160

Ser Pro Gln Cys Arg Glu Arg Phe Ile Tyr Gly Glu Lys Glu Ala Asp
 165 170 175

Ala Gln Ala Asn Asn Leu Arg Gly Gln Leu Val Arg His Tyr Asp Thr
 180 185 190

Ala Gly Arg Ile Gln Thr Asp Ser Ile Ser Leu Ala Gly Leu Pro Leu
 195 200 205

Arg Gln Ser Arg Gln Leu Leu Lys Asn Trp Asp Glu Pro Gly Asp Trp
 210 215 220

Ser Met Asp Glu Glu Ser Ala Trp Ala Ser Leu Leu Ala Ala Glu Ala
 225 230 235 240

Tyr Asp Thr Ser Trp Arg Tyr Asp Ala Gln Asp Arg Val Leu Ala Gln
 245 250 255

Thr Asp Ala Lys Gly Asn Leu Gln Gln Leu Thr Tyr Asn Asp Ala Gly
 260 265 270

Gln Pro Gln Ala Val Ser Leu Lys Leu Gln Gly Gln Ala Glu Gln Arg
 275 280 285

Ile Trp Asn Arg Ile Glu Tyr Asn Ala Ala Gly Gln Val Asp Leu Ala
 290 295 300

Glu Ala Gly Asn Gly Ile Val Thr Glu Tyr Thr Tyr Glu Glu Ser Thr
 305 310 315 320

Gln Arg Leu Ile Arg Lys Lys Asp Ser Arg Gly Leu Ser Ser Gly Glu
 325 330 335

Arg Glu Val Leu Gln Asp Tyr Arg Tyr Glu Tyr Asp Pro Val Gly Asn
 340 345 350

Ile Leu Ser Ile Tyr Asn Glu Ala Glu Pro Val Arg Tyr Phe Arg Asn
 355 360 365

Gln Ala Val Ala Pro Lys Arg Gln Tyr Ala Tyr Asp Ala Leu Tyr Gln
 370 375 380

Leu Val Ser Ser Ser Gly Arg Glu Ser Asp Ala Leu Arg Gln Gln Thr
 385 390 395 400

Ser Leu Pro Pro Leu Ile Thr Pro Ile Pro Leu Asp Asp Ser Gln Tyr
 405 410 415

Val Asn Tyr Ala Glu Lys Tyr Ser Tyr Asp Gln Ala Gly Asn Leu Ile
 420 425 430

Lys Leu Ser His Asn Gly Ala Ser Gln Tyr Thr Thr Asn Val Tyr Val
 435 440 445

Asp Lys Ser Ser Asn Arg Gly Ile Trp Arg Gln Gly Glu Asp Ile Pro
 450 455 460

Asp Ile Ala Ala Ser Phe Asp Arg Ala Gly Asn Gln Gln Ala Leu Phe
 465 470 475 480

Pro Gly Arg Pro Leu Glu Trp Asp Thr Arg Asn Gln Leu Ser Arg Val
 485 490 495

His Met Val Val Arg Glu Gly Gly Asp Asn Asp Trp Glu Gly Tyr Leu
 500 505 510

Tyr Asp Ser Ser Gly Met Arg Ile Val Lys Arg Ser Thr Arg Lys Thr
 515 520 525

Gln Thr Thr Thr Gln Thr Asp Thr Thr Leu Tyr Leu Pro Gly Leu Glu
 530 535 540

Leu Arg Ile Arg Gln Thr Gly Asp Arg Val Thr Glu Ala Leu Gln Val
 545 550 555 560

Ile Thr Val Asp Glu Gly Ala Gly Gln Val Arg Val Leu His Trp Glu
 565 570 575

Asp Gly Thr Glu Pro Gly Gly Ile Ala Asn Asp Gln Tyr Arg Tyr Ser
 580 585 590

Leu Asn Asp His Leu Thr Ser Ser Leu Leu Glu Val Asp Gly Gln Gly
 595 600 605

Gln Ile Ile Ser Lys Glu Glu Phe Tyr Pro Tyr Gly Gly Thr Ala Leu
 610 615 620

Trp Thr Ala Arg Ser Glu Val Glu Ala Ser Tyr Lys Thr Ile Arg Tyr
 625 630 635 640

Ser Gly Lys Glu Arg Asp Ala Thr Gly Leu Tyr Tyr Tyr Gly His Arg
 645 650 655

Tyr Tyr Met Pro Trp Leu Gly Arg Trp Leu Asn Pro Asp Pro Ala Gly
 660 665 670

Met Val Asp Gly Leu Asn Leu Tyr Arg Met Val Arg Asn Asn Pro Ile
 675 680 685

Gly Leu Met Asp Pro Asn Gly Asn Ala Pro Ile Asn Val Ala Asp Tyr
 690 695 700

Ser Phe Val His Gly Asp Leu Val Tyr Gly Leu Ser Lys Glu Arg Gly
 705 710 715 720

Arg Tyr Leu Lys Leu Phe Asn Pro Asn Phe Asn Met Glu Lys Ser Asp
 725 730 735

Ser Pro Ala Met Val Ile Asp Gln Tyr Asn Asn Asn Val Ala Leu Ser
 740 745 750

Ile Thr Asn Gln Tyr Lys Val Glu Glu Leu Met Lys Phe Gln Lys Asp
 755 760 765

Pro Gln Lys Ala Ala Arg Lys Ile Lys Val Pro Glu Gly Asn Arg Leu
 770 775 780

Ser Arg Asn Glu Asn Tyr Pro Leu Trp His Asp Tyr Ile Asn Ile Gly
 785 790 795 800

Glu Ala Lys Ala Ala Phe Lys Ala Ser His Ile Phe Gln Glu Val Lys

805

810

815

Gly Asn Tyr Gly Lys Asp Tyr Tyr His Lys Leu Leu Leu Asp Arg Met
 820 825 830

Ile Glu Ser Pro Leu Leu Trp Lys Arg Gly Ser Lys Leu Gly Leu Glu
 835 840 845

Ile Ala Ala Thr Asn Gln Arg Thr Lys Ile His Phe Val Leu Asp Asn
 850 855 860

Leu Asn Ile Glu Gln Val Val Thr Lys Glu Gly Ser Gly Gly Gln Ser
 865 870 875 880

Ile Thr Ala Ser Glu Leu Arg Tyr Ile Tyr Arg Asn Arg Glu Arg Leu
 885 890 895

Asn Gly Arg Val Ile Phe Tyr Arg Asn Asn Glu Arg Leu Asp Gln Ala
 900 905 910

Pro Trp Gln Glu Asn Pro Asp Leu Trp Ser Lys Tyr Gln Pro Gly Leu
 915 920 925

Arg Gln Ser Ser Ser Arg Val Lys Glu Arg Gly Ile Gly Asn Phe
 930 935 940

Phe Arg Arg Phe Ser Met Lys Arg Lys
 945 950

<210> 44
 <211> 4425
 <212> DNA
 <213> Photorhabdus luminescens

<220>
 <221> CDS
 <222> (1) .. (4422)

<400> 44
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 Met Gln Asn Ser Gln Asp Phe Ser Ile Thr Glu Leu Ser Leu Pro Lys
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 ggg ggg ggc gct atc acg gga atg ggt gaa gca tta acc ccc act gga 96
 Gly Gly Gly Ala Ile Thr Gly Met Gly Glu Ala Leu Thr Pro Thr Gly
 20 25 30

cgc gat ggt atg gcc gcg cta tct cta cca ttg cct att tct gcc ggg Pro Asp Gly Met Ala Ala Leu Ser Leu Pro Leu Pro Ile Ser Ala Gly 35 40 45	144
cgc ggt tat gct ccc gca ttc act ctg aat tac aac agc ggc gcc ggt Arg Gly Tyr Ala Pro Ala Phe Thr Leu Asn Tyr Asn Ser Gly Ala Gly 50 55 60	192
aac agt cca ttt ggt ctg ggt tgg gat tgc aac gtt atg act atc cgc Asn Ser Pro Phe Gly Leu Gly Trp Asp Cys Asn Val Met Thr Ile Arg 65 70 75 80	240
cgc cgc acc cat ttt ggc gtc ccc cat tat gac gaa acc gat acc ttt Arg Arg Thr His Phe Gly Val Pro His Tyr Asp Glu Thr Asp Thr Phe 85 90 95	288
ttg ggg cca gaa ggc gaa gtg ctg gtg gta gcg gat caa cct cgc gac Leu Gly Pro Glu Gly Glu Val Leu Val Val Ala Asp Gln Pro Arg Asp 100 105 110	336
gaa tcc aca tta cag ggt atc aat tta ggc gcc acc ttt acc gtt acc Glu Ser Thr Leu Gln Gly Ile Asn Leu Gly Ala Thr Phe Thr Val Thr 115 120 125	384
ggc tac cgt tcc cgt ctg gaa agc cat ttc agc cga ttg gaa tat tgg Gly Tyr Arg Ser Arg Leu Glu Ser His Phe Ser Arg Leu Glu Tyr Trp 130 135 140	432
caa ccc aaa aca aca ggt aaa aca gat ttt tgg ttg ata tat agc cca Gln Pro Lys Thr Thr Gly Lys Thr Asp Phe Trp Leu Ile Tyr Ser Pro 145 150 155 160	480
gat ggg cag gtg cat cta ctg ggt aaa tca ccg caa gcg cgg atc agc Asp Gly Gln Val His Leu Leu Gly Lys Ser Pro Gln Ala Arg Ile Ser 165 170 175	528
aac cca tcc caa acg aca caa aca gca caa tgg ctg ctg gaa gcc tct Asn Pro Ser Gln Thr Thr Gln Thr Ala Gln Trp Leu Leu Glu Ala Ser 180 185 190	576
gta tca tca cgt ggc gaa caa att tat tat caa tat cgc gcc gaa gat Val Ser Ser Arg Gly Glu Gln Ile Tyr Tyr Gln Tyr Arg Ala Glu Asp 195 200 205	624
gac aca ggt tgc gaa gca gat gaa att acg cac cat tta cag gct aca Asp Thr Gly Cys Glu Ala Asp Glu Ile Thr His His Leu Gln Ala Thr 210 215 220	672
gcg caa cgt tat tta cac atc gtg tat tac ggc aac cgt aca gcc agc Ala Gln Arg Tyr Leu His Ile Val Tyr Tyr Gly Asn Arg Thr Ala Ser 225 230 235 240	720
gaa aca tta ccc ggt ctg gat ggc agc gcc cca tca caa gca gac tgg Glu Thr Leu Pro Gly Leu Asp Gly Ser Ala Pro Ser Gln Ala Asp Trp 245 250 255	768

ttg ttc tat ctg gta ttt gat tac ggc gaa cgc agt aac aac ctg aaa Leu Phe Tyr Leu Val Phe Asp Tyr Gly Glu Arg Ser Asn Asn Leu Lys 260 265 270	816
acg cca cca gca ttt tcg act aca ggt agc tgg ctt tgc cgt cag gac Thr Pro Pro Ala Phe Ser Thr Thr Gly Ser Trp Leu Cys Arg Gln Asp 275 280 285	864
cgt ttt tcc cgt tat gaa tat ggc ttt gag att cgt acc cgc cgc tta Arg Phe Ser Arg Tyr Glu Tyr Gly Phe Glu Ile Arg Thr Arg Arg Leu 290 295 300	912
tgc cgt cag gta ttg atg tac cat cac ctg caa gca ctg gat agt aag Cys Arg Gln Val Leu Met Tyr His His Leu Gln Ala Leu Asp Ser Lys 305 310 315 320	960
ata aca gaa cac aac gga cca acg ctg gtt tca cgc ctg ata ctc aat Ile Thr Glu His Asn Gly Pro Thr Leu Val Ser Arg Leu Ile Leu Asn 325 330 335	1008
tac gac gaa agc gcg ata gcc agc acg cta gta ttc gtt cgc cga gtg Tyr Asp Glu Ser Ala Ile Ala Ser Thr Leu Val Phe Val Arg Arg Val 340 345 350	1056
gga cac gag caa gat ggt aat gtc gtc acc ctg ccg cca tta gaa ttg Gly His Glu Gln Asp Gly Asn Val Val Thr Leu Pro Pro Leu Glu Leu 355 360 365	1104
gca tat cag gat ttt tca ccg cga cat cac gct cac tgg caa cca atg Ala Tyr Gln Asp Phe Ser Pro Arg His His Ala His Trp Gln Pro Met 370 375 380	1152
gat gta ctg gca aac ttc aat gcc att cag cgc tgg cag cta gtc gat Asp Val Leu Ala Asn Phe Asn Ala Ile Gln Arg Trp Gln Leu Val Asp 385 390 395 400	1200
cta aaa ggc gaa gga tta ccc ggc ctg tta tat cag gat aaa ggc gct Leu Lys Gly Glu Gly Leu Pro Gly Leu Leu Tyr Gln Asp Lys Gly Ala 405 410 415	1248
tgg tgg tac cgc tcc gca cag cgt ctg ggc gaa att ggc tca gat gcc Trp Trp Tyr Arg Ser Ala Gln Arg Leu Gly Glu Ile Gly Ser Asp Ala 420 425 430	1296
gtc act tgg gaa aag atg caa cct tta tcg gtt att cct tct ttg caa Val Thr Trp Glu Lys Met Gln Pro Leu Ser Val Ile Pro Ser Leu Gln 435 440 445	1344
agt aat gcc tcg ttg gtg gat atc aat gga gac ggc caa ctt gac tgg Ser Asn Ala Ser Leu Val Asp Ile Asn Gly Asp Gly Gln Leu Asp Trp 450 455 460	1392
gtt atc acc gga ccg gga tta cgg gga tat cat agt caa cgc ccg gat Val Ile Thr Gly Pro Gly Leu Arg Gly Tyr His Ser Gln Arg Pro Asp 465 470 475 480	1440
ggc agt tgg aca cgt ttt acc cca ctc aac gct ctg ccg gtg gaa tac	1488

Gly	Ser	Trp	Thr	Arg	Phe	Thr	Pro	Leu	Asn	Ala	Leu	Pro	Val	Glu	Tyr		
				485					490					495			
acc	cat	cca	cgc	gcg	caa	ctc	gca	gat	tta	atg	gga	gcc	ggg	cta	tcc	1536	
Thr	His	Pro	Arg	Ala	Gln	Leu	Ala	Asp	Leu	Met	Gly	Ala	Gly	Leu	Ser		
			500					505					510				
gat	ttg	gtg	ctg	atc	ggc	cct	aag	agc	gtg	cgt	tta	tat	gcc	aat	acc	1584	
Asp	Leu	Val	Leu	Ile	Gly	Pro	Lys	Ser	Val	Arg	Leu	Tyr	Ala	Asn	Thr		
			515				520					525					
cgc	gac	ggc	ttt	gcc	aaa	gga	aaa	gat	gtg	gtg	caa	tcc	ggg	gat	atc	1632	
Arg	Asp	Gly	Phe	Ala	Lys	Gly	Lys	Asp	Val	Val	Gln	Ser	Gly	Asp	Ile		
	530					535					540						
aca	ctg	ccg	gtg	ccg	ggc	gcc	gat	cca	cgt	aag	ttg	gtg	gcg	ttt	agt	1680	
Thr	Leu	Pro	Val	Pro	Gly	Ala	Asp	Pro	Arg	Lys	Leu	Val	Ala	Phe	Ser		
	545				550				555						560		
gat	gta	ttg	ggg	tca	ggg	caa	gcc	cat	ctg	gtt	gaa	gta	agc	gcg	act	1728	
Asp	Val	Leu	Gly	Ser	Gly	Gln	Ala	His	Leu	Val	Glu	Val	Ser	Ala	Thr		
				565					570					575			
aaa	gtc	acc	tgc	tgg	cct	aat	ctg	ggg	cgc	gga	cgt	ttt	ggg	caa	ccc	1776	
Lys	Val	Thr	Cys	Trp	Pro	Asn	Leu	Gly	Arg	Gly	Arg	Phe	Gly	Gln	Pro		
			580					585					590				
att	acc	tta	ccg	gga	ttc	agc	cag	cca	gca	acc	gag	ttt	aac	ccg	gct	1824	
Ile	Thr	Leu	Pro	Gly	Phe	Ser	Gln	Pro	Ala	Thr	Glu	Phe	Asn	Pro	Ala		
			595				600					605					
caa	gtt	tat	ctg	gcc	gat	ctg	gat	ggc	agc	ggg	cca	acg	gat	ctg	att	1872	
Gln	Val	Tyr	Leu	Ala	Asp	Leu	Asp	Gly	Ser	Gly	Pro	Thr	Asp	Leu	Ile		
	610					615					620						
tat	gtt	cat	aca	aac	cgt	ctg	gat	atc	ttc	ctg	aac	aaa	agt	ggc	aat	1920	
Tyr	Val	His	Thr	Asn	Arg	Leu	Asp	Ile	Phe	Leu	Asn	Lys	Ser	Gly	Asn		
	625				630				635					640			
ggc	ttt	gct	gaa	cca	gtg	aca	tta	cgc	ttc	ccg	gaa	ggg	ctg	cgt	ttt	1968	
Gly	Phe	Ala	Glu	Pro	Val	Thr	Leu	Arg	Phe	Pro	Glu	Gly	Leu	Arg	Phe		
			645					650					655				
gat	cat	acc	tgt	cag	tta	caa	atg	gcc	gat	gta	caa	gga	tta	ggc	gtc	2016	
Asp	His	Thr	Cys	Gln	Leu	Gln	Met	Ala	Asp	Val	Gln	Gly	Leu	Gly	Val		
			660					665					670				
gcc	agc	ctg	ata	ctg	agc	gtg	ccg	cat	atg	tct	ccc	cat	cac	tgg	cgc	2064	
Ala	Ser	Leu	Ile	Leu	Ser	Val	Pro	His	Met	Ser	Pro	His	His	Trp	Arg		
			675				680					685					
tgc	gat	ctg	acc	aac	atg	aag	ccg	tgg	tta	ctc	aat	gaa	atg	aac	aac	2112	
Cys	Asp	Leu	Thr	Asn	Met	Lys	Pro	Trp	Leu	Leu	Asn	Glu	Met	Asn	Asn		
	690					695					700						
aat	atg	ggg	gtc	cat	cac	acc	ttg	cgt	tac	cgc	agt	tcc	tcc	caa	ttc	2160	
Asn	Met	Gly	Val	His	His	Thr	Leu	Arg	Tyr	Arg	Ser	Ser	Ser	Gln	Phe		

705	710	715	720	
tgg ctg gat gaa aaa gcc gcg gcg ctg act acc gga caa aca ccg gtt				2208
Trp Leu Asp Glu Lys Ala Ala Ala Leu Thr Thr Gly Gln Thr Pro Val				
725		730	735	
tgc tat ctc ccc ttc ccg atc cac acc cta tgg caa acg gaa aca gaa				2256
Cys Tyr Leu Pro Phe Pro Ile His Thr Leu Trp Gln Thr Glu Thr Glu				
740		745	750	
gat gaa atc agc ggc aac aaa tta gtc aca aca ctt cgt tat gct cgt				2304
Asp Glu Ile Ser Gly Asn Lys Leu Val Thr Thr Leu Arg Tyr Ala Arg				
755		760	765	
ggc gca tgg gac gga cgc gag cgg gaa ttt cgc gga ttt ggt tat gta				2352
Gly Ala Trp Asp Gly Arg Glu Arg Glu Phe Arg Gly Phe Gly Tyr Val				
770		775	780	
gag cag aca gac agc cat caa ctg gct caa ggc aac gcg cca gaa cgt				2400
Glu Gln Thr Asp Ser His Gln Leu Ala Gln Gly Asn Ala Pro Glu Arg				
785		790	795	800
acg cca ccg gcg ctg acc aaa aac tgg tat gcc acc gga ctg ccg gtg				2448
Thr Pro Pro Ala Leu Thr Lys Asn Trp Tyr Ala Thr Gly Leu Pro Val				
805		810	815	
ata gat aac gca tta tca acc gag tat tgg cgt gat gat cag gct ttt				2496
Ile Asp Asn Ala Leu Ser Thr Glu Tyr Trp Arg Asp Asp Gln Ala Phe				
820		825	830	
gcc ggt ttc tca ccg cgc ttt acg act tgg caa gat aac aaa gat gtc				2544
Ala Gly Phe Ser Pro Arg Phe Thr Thr Trp Gln Asp Asn Lys Asp Val				
835		840	845	
ccg tta aca ccg gaa gat gat aac agt cgt tac tgg ttc aac cgc gcg				2592
Pro Leu Thr Pro Glu Asp Asp Asn Ser Arg Tyr Trp Phe Asn Arg Ala				
850		855	860	
ttg aaa ggt caa ctg cta cgt agt gaa ctg tac gga ttg gac gat agt				2640
Leu Lys Gly Gln Leu Leu Arg Ser Glu Leu Tyr Gly Leu Asp Asp Ser				
865		870	875	880
aca aat aaa cac gtt ccc tat act gtc act gaa ttt cgt tca cag gta				2688
Thr Asn Lys His Val Pro Tyr Thr Val Thr Glu Phe Arg Ser Gln Val				
885		890	895	
cgt cga tta cag cat acc gac agc cga tac cct gta ctt tgg tca tct				2736
Arg Arg Leu Gln His Thr Asp Ser Arg Tyr Pro Val Leu Trp Ser Ser				
900		905	910	
gta gtt gaa agc cgc aac tat cac tac gaa cgt atc gcc agc gac ccg				2784
Val Val Glu Ser Arg Asn Tyr His Tyr Glu Arg Ile Ala Ser Asp Pro				
915		920	925	
caa tgc agt caa aat att acg cta tcc agt gat cga ttt ggt cag ccg				2832
Gln Cys Ser Gln Asn Ile Thr Leu Ser Ser Asp Arg Phe Gly Gln Pro				
930		935	940	

cta aaa cag ctt tcg gta cag tac ccg cgc cgc cag cag cca gca atc Leu Lys Gln Leu Ser Val Gln Tyr Pro Arg Arg Gln Gln Pro Ala Ile 945 950 955 960	2880
aat ctg tat cct gat aca ttg cct gat aag ttg tta gcc aac agc tat Asn Leu Tyr Pro Asp Thr Leu Pro Asp Lys Leu Leu Ala Asn Ser Tyr 965 970 975	2928
gat gac caa caa cgc caa tta cgg ctc acc tat caa caa tcc agt tgg Asp Asp Gln Gln Arg Gln Leu Arg Leu Thr Tyr Gln Gln Ser Ser Trp 980 985 990	2976
cat cac ctg acc aac aat acc gtt cga gta ttg gga tta ccg gat agt His His Leu Thr Asn Asn Thr Val Arg Val Leu Gly Leu Pro Asp Ser 995 1000 1005	3024
acc cgc agt gat atc ttt act tat ggc gct gaa aat gtg cct gct Thr Arg Ser Asp Ile Phe Thr Tyr Gly Ala Glu Asn Val Pro Ala 1010 1015 1020	3069
ggg ggt tta aat ctg gaa ctt ctg agt gat aaa aat agc ctg atc Gly Gly Leu Asn Leu Glu Leu Leu Ser Asp Lys Asn Ser Leu Ile 1025 1030 1035	3114
gcg gac gat aaa cca cgt gaa tac ctc ggt cag caa aaa acc gct Ala Asp Asp Lys Pro Arg Glu Tyr Leu Gly Gln Gln Lys Thr Ala 1040 1045 1050	3159
tat acc gat gga caa aat aca acg ccg ttg caa aca cca aca cgg Tyr Thr Asp Gly Gln Asn Thr Thr Pro Leu Gln Thr Pro Thr Arg 1055 1060 1065	3204
caa gcc ctg att gcc ttt acc gaa aca acg gta ttc aac cag tcc Gln Ala Leu Ile Ala Phe Thr Glu Thr Thr Val Phe Asn Gln Ser 1070 1075 1080	3249
aca tta tca gcg ttt aac gga agc atc ccg tcc gat aaa tta tca Thr Leu Ser Ala Phe Asn Gly Ser Ile Pro Ser Asp Lys Leu Ser 1085 1090 1095	3294
acg acg ctg gag caa gct gga tat cag caa aca aat tat cta ttc Thr Thr Leu Glu Gln Ala Gly Tyr Gln Gln Thr Asn Tyr Leu Phe 1100 1105 1110	3339
cct cgc act gga gaa gat aaa gtt tgg gta gcc cat cac ggc tat Pro Arg Thr Gly Glu Asp Lys Val Trp Val Ala His His Gly Tyr 1115 1120 1125	3384
acc gat tat ggt aca gcg gca cag ttc tgg cgc ccg caa aaa cag Thr Asp Tyr Gly Thr Ala Ala Gln Phe Trp Arg Pro Gln Lys Gln 1130 1135 1140	3429
agc aac acc caa ctc acc ggt aaa atc acc ctc atc tgg gat gca Ser Asn Thr Gln Leu Thr Gly Lys Ile Thr Leu Ile Trp Asp Ala 1145 1150 1155	3474

aac tat	tgc gtt	gtg gta	caa acc	cgg gat	gct gct	gga ctg	aca	3519
Asn Tyr	Cys Val	Val Val	Gln Thr	Arg Asp	Ala Ala	Gly Leu	Thr	
1160			1165			1170		
acc tca	gcc aaa	tat gac	tgg cgt	ttt ctg	acc ccg	gtg caa	ctc	3564
Thr Ser	Ala Lys	Tyr Asp	Trp Arg	Phe Leu	Thr Pro	Val Gln	Leu	
1175			1180			1185		
acc gat	atc aat	gac aat	cag cac	ctt atc	aca ctg	gat gca	ttg	3609
Thr Asp	Ile Asn	Asp Asn	Gln His	Leu Ile	Thr Leu	Asp Ala	Leu	
1190			1195			1200		
ggc cga	cca atc	aca ttg	cgc ttt	tgg gga	act gaa	aac ggc	aag	3654
Gly Arg	Pro Ile	Thr Leu	Arg Phe	Trp Gly	Thr Glu	Asn Gly	Lys	
1205			1210			1215		
atg aca	ggg tat	tcc tca	ccg gaa	aaa gca	tca ttt	tct cca	cca	3699
Met Thr	Gly Tyr	Ser Ser	Pro Glu	Lys Ala	Ser Phe	Ser Pro	Pro	
1220			1225			1230		
tcc gat	gtt aat	gcc gct	att gag	tta aaa	aaa ccg	ctc cct	gta	3744
Ser Asp	Val Asn	Ala Ala	Ile Glu	Leu Lys	Lys Pro	Leu Pro	Val	
1235			1240			1245		
gca cag	tgt cag	gtc tac	gca cca	gaa agc	tgg atg	cca gta	tta	3789
Ala Gln	Cys Gln	Val Tyr	Ala Pro	Glu Ser	Trp Met	Pro Val	Leu	
1250			1255			1260		
agt cag	aaa acc	ttc aat	cga ctg	gca gaa	caa gat	tgg caa	aag	3834
Ser Gln	Lys Thr	Phe Asn	Arg Leu	Ala Glu	Gln Asp	Trp Gln	Lys	
1265			1270			1275		
tta tat	aac gcc	cga atc	atc acc	gaa gat	gga cgt	atc tgc	aca	3879
Leu Tyr	Asn Ala	Arg Ile	Ile Thr	Glu Asp	Gly Arg	Ile Cys	Thr	
1280			1285			1290		
ctg gct	tat cgc	cgc tgg	gta caa	agc caa	aag gca	atc cct	caa	3924
Leu Ala	Tyr Arg	Arg Trp	Val Gln	Ser Gln	Lys Ala	Ile Pro	Gln	
1295			1300			1305		
ctc att	agc ctg	tta aac	aac gga	ccc cgt	tta cct	cct cac	agc	3969
Leu Ile	Ser Leu	Leu Asn	Asn Gly	Pro Arg	Leu Pro	Pro His	Ser	
1310			1315			1320		
ctg aca	ttg acg	acg gat	cgt tat	gat cac	gat cct	gag caa	cag	4014
Leu Thr	Leu Thr	Thr Asp	Arg Tyr	Asp His	Asp Pro	Glu Gln	Gln	
1325			1330			1335		
atc cgt	caa cag	gtg gta	ttc agt	gat ggc	ttt ggc	cgc ttg	ctg	4059
Ile Arg	Gln Gln	Val Val	Phe Ser	Asp Gly	Phe Gly	Arg Leu	Leu	
1340			1345			1350		
caa gcc	gct gcc	cga cat	gag gca	ggc atg	gcc cgg	caa cgc	aat	4104
Gln Ala	Ala Ala	Arg His	Glu Ala	Gly Met	Ala Arg	Gln Arg	Asn	
1355			1360			1365		
gaa gac	ggc tct	ttg att	ata aat	gtc cag	cat act	gag aac	cgt	4149

Glu Asp	Gly Ser	Leu Ile	Ile	Asn Val	Gln His	Thr	Glu Asn	Arg	
1370			1375			1380			
tgg gca	gtg act	gga cga	acg	gaa tat	gac aat	aag	ggg caa	ccg	4194
Trp Ala	Val Thr	Gly Arg	Thr	Glu Tyr	Asp Asn	Lys	Gly Gln	Pro	
1385			1390			1395			
ata cgt	acc tat	cag ccc	tat	ttc ctc	aat gac	tgg	cga tac	gtc	4239
Ile Arg	Thr Tyr	Gln Pro	Tyr	Phe Leu	Asn Asp	Trp	Arg Tyr	Val	
1400			1405			1410			
agc aat	gat agt	gcc cgg	cag	gaa aaa	gaa gct	tat	gca gat	acc	4284
Ser Asn	Asp Ser	Ala Arg	Gln	Glu Lys	Glu Ala	Tyr	Ala Asp	Thr	
1415			1420			1425			
cat gtc	tat gat	ccc ata	ggg	cga gaa	atc aag	gtt	atc acc	gca	4329
His Val	Tyr Asp	Pro Ile	Gly	Arg Glu	Ile Lys	Val	Ile Thr	Ala	
1430			1435			1440			
aaa ggt	tgg ttc	cgt cga	acc	ttg ttc	act ccc	tgg	ttt act	gtc	4374
Lys Gly	Trp Phe	Arg Arg	Thr	Leu Phe	Thr Pro	Trp	Phe Thr	Val	
1445			1450			1455			
aat gaa	gat gaa	aat gac	aca	gcc gct	gag gtg	aag	aag gta	aag	4419
Asn Glu	Asp Glu	Asn Asp	Thr	Ala Ala	Glu Val	Lys	Lys Val	Lys	
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atg taa									4425
Met									

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Pro Asp Gly Met Ala Ala Leu Ser Leu Pro Leu Pro Ile Ser Ala Gly	
35 40 45	

Arg Gly Tyr Ala Pro Ala Phe Thr Leu Asn Tyr Asn Ser Gly Ala Gly	
50 55 60	

Asn Ser Pro Phe Gly Leu Gly Trp Asp Cys Asn Val Met Thr Ile Arg	
65 70 75 80	

Arg Arg Thr His Phe Gly Val Pro His Tyr Asp Glu Thr Asp Thr Phe
85 90 95

Leu Gly Pro Glu Gly Glu Val Leu Val Val Ala Asp Gln Pro Arg Asp
100 105 110

Glu Ser Thr Leu Gln Gly Ile Asn Leu Gly Ala Thr Phe Thr Val Thr
115 120 125

Gly Tyr Arg Ser Arg Leu Glu Ser His Phe Ser Arg Leu Glu Tyr Trp
130 135 140

Gln Pro Lys Thr Thr Gly Lys Thr Asp Phe Trp Leu Ile Tyr Ser Pro
145 150 155 160

Asp Gly Gln Val His Leu Leu Gly Lys Ser Pro Gln Ala Arg Ile Ser
165 170 175

Asn Pro Ser Gln Thr Thr Gln Thr Ala Gln Trp Leu Leu Glu Ala Ser
180 185 190

Val Ser Ser Arg Gly Glu Gln Ile Tyr Tyr Gln Tyr Arg Ala Glu Asp
195 200 205

Asp Thr Gly Cys Glu Ala Asp Glu Ile Thr His His Leu Gln Ala Thr
210 215 220

Ala Gln Arg Tyr Leu His Ile Val Tyr Tyr Gly Asn Arg Thr Ala Ser
225 230 235 240

Glu Thr Leu Pro Gly Leu Asp Gly Ser Ala Pro Ser Gln Ala Asp Trp
245 250 255

Leu Phe Tyr Leu Val Phe Asp Tyr Gly Glu Arg Ser Asn Asn Leu Lys
260 265 270

Thr Pro Pro Ala Phe Ser Thr Thr Gly Ser Trp Leu Cys Arg Gln Asp
275 280 285

Arg Phe Ser Arg Tyr Glu Tyr Gly Phe Glu Ile Arg Thr Arg Arg Leu
290 295 300

Cys Arg Gln Val Leu Met Tyr His His Leu Gln Ala Leu Asp Ser Lys
305 310 315 320

Ile Thr Glu His Asn Gly Pro Thr Leu Val Ser Arg Leu Ile Leu Asn
325 330 335

Tyr Asp Glu Ser Ala Ile Ala Ser Thr Leu Val Phe Val Arg Arg Val
340 345 350

Gly His Glu Gln Asp Gly Asn Val Val Thr Leu Pro Pro Leu Glu Leu
355 360 365

Ala Tyr Gln Asp Phe Ser Pro Arg His His Ala His Trp Gln Pro Met
370 375 380

Asp Val Leu Ala Asn Phe Asn Ala Ile Gln Arg Trp Gln Leu Val Asp
385 390 395 400

Leu Lys Gly Glu Gly Leu Pro Gly Leu Leu Tyr Gln Asp Lys Gly Ala
405 410 415

Trp Trp Tyr Arg Ser Ala Gln Arg Leu Gly Glu Ile Gly Ser Asp Ala
420 425 430

Val Thr Trp Glu Lys Met Gln Pro Leu Ser Val Ile Pro Ser Leu Gln
435 440 445

Ser Asn Ala Ser Leu Val Asp Ile Asn Gly Asp Gly Gln Leu Asp Trp
450 455 460

Val Ile Thr Gly Pro Gly Leu Arg Gly Tyr His Ser Gln Arg Pro Asp
465 470 475 480

Gly Ser Trp Thr Arg Phe Thr Pro Leu Asn Ala Leu Pro Val Glu Tyr
485 490 495

Thr His Pro Arg Ala Gln Leu Ala Asp Leu Met Gly Ala Gly Leu Ser
500 505 510

Asp Leu Val Leu Ile Gly Pro Lys Ser Val Arg Leu Tyr Ala Asn Thr
515 520 525

Arg Asp Gly Phe Ala Lys Gly Lys Asp Val Val Gln Ser Gly Asp Ile
530 535 540

Thr Leu Pro Val Pro Gly Ala Asp Pro Arg Lys Leu Val Ala Phe Ser
545 550 555 560

Asp Val Leu Gly Ser Gly Gln Ala His Leu Val Glu Val Ser Ala Thr
565 570 575

Lys Val Thr Cys Trp Pro Asn Leu Gly Arg Gly Arg Phe Gly Gln Pro
580 585 590

Ile Thr Leu Pro Gly Phe Ser Gln Pro Ala Thr Glu Phe Asn Pro Ala
595 600 605

Gln Val Tyr Leu Ala Asp Leu Asp Gly Ser Gly Pro Thr Asp Leu Ile
610 615 620

Tyr Val His Thr Asn Arg Leu Asp Ile Phe Leu Asn Lys Ser Gly Asn
625 630 635 640

Gly Phe Ala Glu Pro Val Thr Leu Arg Phe Pro Glu Gly Leu Arg Phe
645 650 655

Asp His Thr Cys Gln Leu Gln Met Ala Asp Val Gln Gly Leu Gly Val
660 665 670

Ala Ser Leu Ile Leu Ser Val Pro His Met Ser Pro His His Trp Arg
675 680 685

Cys Asp Leu Thr Asn Met Lys Pro Trp Leu Leu Asn Glu Met Asn Asn
690 695 700

Asn Met Gly Val His His Thr Leu Arg Tyr Arg Ser Ser Ser Gln Phe
705 710 715 720

Trp Leu Asp Glu Lys Ala Ala Ala Leu Thr Thr Gly Gln Thr Pro Val
725 730 735

Cys Tyr Leu Pro Phe Pro Ile His Thr Leu Trp Gln Thr Glu Thr Glu
740 745 750

Asp Glu Ile Ser Gly Asn Lys Leu Val Thr Thr Leu Arg Tyr Ala Arg

755

760

765

Gly Ala Trp Asp Gly Arg Glu Arg Glu Phe Arg Gly Phe Gly Tyr Val
 770 775 780

Glu Gln Thr Asp Ser His Gln Leu Ala Gln Gly Asn Ala Pro Glu Arg
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Thr Pro Pro Ala Leu Thr Lys Asn Trp Tyr Ala Thr Gly Leu Pro Val
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Ile Asp Asn Ala Leu Ser Thr Glu Tyr Trp Arg Asp Asp Gln Ala Phe
 820 825 830

Ala Gly Phe Ser Pro Arg Phe Thr Thr Trp Gln Asp Asn Lys Asp Val
 835 840 845

Pro Leu Thr Pro Glu Asp Asp Asn Ser Arg Tyr Trp Phe Asn Arg Ala
 850 855 860

Leu Lys Gly Gln Leu Leu Arg Ser Glu Leu Tyr Gly Leu Asp Asp Ser
 865 870 875 880

Thr Asn Lys His Val Pro Tyr Thr Val Thr Glu Phe Arg Ser Gln Val
 885 890 895

Arg Arg Leu Gln His Thr Asp Ser Arg Tyr Pro Val Leu Trp Ser Ser
 900 905 910

Val Val Glu Ser Arg Asn Tyr His Tyr Glu Arg Ile Ala Ser Asp Pro
 915 920 925

Gln Cys Ser Gln Asn Ile Thr Leu Ser Ser Asp Arg Phe Gly Gln Pro
 930 935 940

Leu Lys Gln Leu Ser Val Gln Tyr Pro Arg Arg Gln Gln Pro Ala Ile
 945 950 955 960

Asn Leu Tyr Pro Asp Thr Leu Pro Asp Lys Leu Leu Ala Asn Ser Tyr
 965 970 975

Asp Asp Gln Gln Arg Gln Leu Arg Leu Thr Tyr Gln Gln Ser Ser Trp
 980 985 990

His His Leu Thr Asn Asn Thr Val Arg Val Leu Gly Leu Pro Asp Ser
 995 1000 1005

Thr Arg Ser Asp Ile Phe Thr Tyr Gly Ala Glu Asn Val Pro Ala
 1010 1015 1020

Gly Gly Leu Asn Leu Glu Leu Leu Ser Asp Lys Asn Ser Leu Ile
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Ala Asp Asp Lys Pro Arg Glu Tyr Leu Gly Gln Gln Lys Thr Ala
 1040 1045 1050

Tyr Thr Asp Gly Gln Asn Thr Thr Pro Leu Gln Thr Pro Thr Arg
 1055 1060 1065

Gln Ala Leu Ile Ala Phe Thr Glu Thr Thr Val Phe Asn Gln Ser
 1070 1075 1080

Thr Leu Ser Ala Phe Asn Gly Ser Ile Pro Ser Asp Lys Leu Ser
 1085 1090 1095

Thr Thr Leu Glu Gln Ala Gly Tyr Gln Gln Thr Asn Tyr Leu Phe
 1100 1105 1110

Pro Arg Thr Gly Glu Asp Lys Val Trp Val Ala His His Gly Tyr
 1115 1120 1125

Thr Asp Tyr Gly Thr Ala Ala Gln Phe Trp Arg Pro Gln Lys Gln
 1130 1135 1140

Ser Asn Thr Gln Leu Thr Gly Lys Ile Thr Leu Ile Trp Asp Ala
 1145 1150 1155

Asn Tyr Cys Val Val Val Gln Thr Arg Asp Ala Ala Gly Leu Thr
 1160 1165 1170

Thr Ser Ala Lys Tyr Asp Trp Arg Phe Leu Thr Pro Val Gln Leu
 1175 1180 1185

Thr Asp Ile Asn Asp Asn Gln His Leu Ile Thr Leu Asp Ala Leu
 1190 1195 1200

Gly	Arg	Pro	Ile	Thr	Leu	Arg	Phe	Trp	Gly	Thr	Glu	Asn	Gly	Lys
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Met	Thr	Gly	Tyr	Ser	Ser	Pro	Glu	Lys	Ala	Ser	Phe	Ser	Pro	Pro
1220						1225					1230			
Ser	Asp	Val	Asn	Ala	Ala	Ile	Glu	Leu	Lys	Lys	Pro	Leu	Pro	Val
1235						1240					1245			
Ala	Gln	Cys	Gln	Val	Tyr	Ala	Pro	Glu	Ser	Trp	Met	Pro	Val	Leu
1250						1255					1260			
Ser	Gln	Lys	Thr	Phe	Asn	Arg	Leu	Ala	Glu	Gln	Asp	Trp	Gln	Lys
1265						1270					1275			
Leu	Tyr	Asn	Ala	Arg	Ile	Ile	Thr	Glu	Asp	Gly	Arg	Ile	Cys	Thr
1280						1285					1290			
Leu	Ala	Tyr	Arg	Arg	Trp	Val	Gln	Ser	Gln	Lys	Ala	Ile	Pro	Gln
1295						1300					1305			
Leu	Ile	Ser	Leu	Leu	Asn	Asn	Gly	Pro	Arg	Leu	Pro	Pro	His	Ser
1310						1315					1320			
Leu	Thr	Leu	Thr	Thr	Asp	Arg	Tyr	Asp	His	Asp	Pro	Glu	Gln	Gln
1325						1330					1335			
Ile	Arg	Gln	Gln	Val	Val	Phe	Ser	Asp	Gly	Phe	Gly	Arg	Leu	Leu
1340						1345					1350			
Gln	Ala	Ala	Ala	Arg	His	Glu	Ala	Gly	Met	Ala	Arg	Gln	Arg	Asn
1355						1360					1365			
Glu	Asp	Gly	Ser	Leu	Ile	Ile	Asn	Val	Gln	His	Thr	Glu	Asn	Arg
1370						1375					1380			
Trp	Ala	Val	Thr	Gly	Arg	Thr	Glu	Tyr	Asp	Asn	Lys	Gly	Gln	Pro
1385						1390					1395			
Ile	Arg	Thr	Tyr	Gln	Pro	Tyr	Phe	Leu	Asn	Asp	Trp	Arg	Tyr	Val
1400						1405					1410			

Ser Asn Asp Ser Ala Arg Gln Glu Lys Glu Ala Tyr Ala Asp Thr
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His Val Tyr Asp Pro Ile Gly Arg Glu Ile Lys Val Ile Thr Ala
 1430 1435 1440

Lys Gly Trp Phe Arg Arg Thr Leu Phe Thr Pro Trp Phe Thr Val
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Asn Glu Asp Glu Asn Asp Thr Ala Ala Glu Val Lys Lys Val Lys
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Met

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 Val Tyr Asp Asn Arg Gly Leu Ile Ile Arg Asn Ile Asp Phe His Arg
 20 25 30
 act acc gca aat ggt gat ccc gat acc cgt att acc cgc cat caa tac 144
 Thr Thr Ala Asn Gly Asp Pro Asp Thr Arg Ile Thr Arg His Gln Tyr
 35 40 45
 gat att cac gga cac cta aat caa agc atc gat ccg cgc cta tat gaa 192
 Asp Ile His Gly His Leu Asn Gln Ser Ile Asp Pro Arg Leu Tyr Glu
 50 55 60
 gcc aag caa acc aac aat acg atc aaa ccc aat ttt ctt tgg cag tat 240
 Ala Lys Gln Thr Asn Asn Thr Ile Lys Pro Asn Phe Leu Trp Gln Tyr
 65 70 75 80
 gat ttg acc ggt aat ccc cta tgt aca gag agc att gat gca ggt cgc 288
 Asp Leu Thr Gly Asn Pro Leu Cys Thr Glu Ser Ile Asp Ala Gly Arg
 85 90 95
 act gtc acc ttg aat gat att gaa ggc cgt ccg cta cta acg gtg act 336
 Thr Val Thr Leu Asn Asp Ile Glu Gly Arg Pro Leu Leu Thr Val Thr

100	105	110	
gca aca ggg gtt ata caa act cga caa tat gaa act tct tcc ctg ccc			384
Ala Thr Gly Val Ile Gln Thr Arg Gln Tyr Glu Thr Ser Ser Leu Pro			
115	120	125	
ggt cgt ctg tta tct gtt gcc gaa caa aca ccc gag gaa aaa aca tcc			432
Gly Arg Leu Leu Ser Val Ala Glu Gln Thr Pro Glu Glu Lys Thr Ser			
130	135	140	
cgt atc acc gaa cgc ctg att tgg gct ggc aat acc gaa gca gag aaa			480
Arg Ile Thr Glu Arg Leu Ile Trp Ala Gly Asn Thr Glu Ala Glu Lys			
145	150	155	160
gac cat aac ctt gcc ggc cag tgc gtg cgt cac tat gac acg gcg gga			528
Asp His Asn Leu Ala Gly Gln Cys Val Arg His Tyr Asp Thr Ala Gly			
165	170	175	
gtt acc cgg tta gag agt tta tca ctg acc ggt act gtt tta tct caa			576
Val Thr Arg Leu Glu Ser Leu Ser Leu Thr Gly Thr Val Leu Ser Gln			
180	185	190	
tcc agc caa cta ttg atc gac act caa gag gca aac tgg aca ggt gat			624
Ser Ser Gln Leu Leu Ile Asp Thr Gln Glu Ala Asn Trp Thr Gly Asp			
195	200	205	
aac gaa acc gtc tgg caa aac atg ctg gct gat gac atc tac aca acc			672
Asn Glu Thr Val Trp Gln Asn Met Leu Ala Asp Asp Ile Tyr Thr Thr			
210	215	220	
ctg agc acc ttc gat gcc acc ggt gct tta ctg act cag acc gat gcg			720
Leu Ser Thr Phe Asp Ala Thr Gly Ala Leu Leu Thr Gln Thr Asp Ala			
225	230	235	240
aaa ggg aac att cag aga ctg gct tat gat gtg gcc ggg cag cta aac			768
Lys Gly Asn Ile Gln Arg Leu Ala Tyr Asp Val Ala Gly Gln Leu Asn			
245	250	255	
ggg agc tgg cta aca ctc aaa ggc cag acg gaa caa gtg att atc aaa			816
Gly Ser Trp Leu Thr Leu Lys Gly Gln Thr Glu Gln Val Ile Ile Lys			
260	265	270	
tcc ctg acc tac tcc gcc gcc gga caa aaa tta cgt gag gaa cac ggc			864
Ser Leu Thr Tyr Ser Ala Ala Gly Gln Lys Leu Arg Glu Glu His Gly			
275	280	285	
aat gat gtt atc acc gaa tac agt tat gaa ccg gaa acc caa cgg ctg			912
Asn Asp Val Ile Thr Glu Tyr Ser Tyr Glu Pro Glu Thr Gln Arg Leu			
290	295	300	
atc ggt atc aaa acc cgc cgt ccg tca gac act aaa gtg cta caa gac			960
Ile Gly Ile Lys Thr Arg Arg Pro Ser Asp Thr Lys Val Leu Gln Asp			
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ctg cgc tat gaa tat gac ccg gta ggc aat gtc atc agc atc cgt aat			1008
Leu Arg Tyr Glu Tyr Asp Pro Val Gly Asn Val Ile Ser Ile Arg Asn			
325	330	335	

gac gcg gaa gcc acc cgc ttt tgg cac aat cag aaa gtg atg ccg gaa Asp Ala Glu Ala Thr Arg Phe Trp His Asn Gln Lys Val Met Pro Glu 340 345 350	1056
aac act tat acc tac gat tcc ctg tat cag ctt atc agc gcc acc ggg Asn Thr Tyr Thr Tyr Asp Ser Leu Tyr Gln Leu Ile Ser Ala Thr Gly 355 360 365	1104
cgc gaa atg gcg aat ata ggt caa caa agt cac caa ttt ccc tca ccc Arg Glu Met Ala Asn Ile Gly Gln Gln Ser His Gln Phe Pro Ser Pro 370 375 380	1152
gct cta cct tct gat aac aac acc tat acc aac tat acc cgt act tat Ala Leu Pro Ser Asp Asn Asn Thr Tyr Thr Asn Tyr Thr Arg Thr Tyr 385 390 395 400	1200
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gcg acg caa aac aac tac acc acc aat atc acg gtt tca aat cgc agc Ala Thr Gln Asn Asn Tyr Thr Thr Asn Ile Thr Val Ser Asn Arg Ser 420 425 430	1296
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gct ttg ttt gat gca ggc gga cat cag aac acc ttg ata tca gga caa Ala Leu Phe Asp Ala Gly Gly His Gln Asn Thr Leu Ile Ser Gly Gln 450 455 460	1392
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ggt gac gga aga agg atg tta aaa atc aat gaa cag cag gcc agc aac Gly Asp Gly Arg Arg Met Leu Lys Ile Asn Glu Gln Gln Ala Ser Asn 500 505 510	1536
aac gct caa aca caa cgt gtg act tat ttg ccg aac tta gaa ctt cgt Asn Ala Gln Thr Gln Arg Val Thr Tyr Leu Pro Asn Leu Glu Leu Arg 515 520 525	1584
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gcc agg aat cag aca gaa gcc agt tat aaa act atc cgt tat tca ggc Ala Arg Asn Gln Thr Glu Ala Ser Tyr Lys Thr Ile Arg Tyr Ser Gly 610 615 620	1872
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caa ccg tgg ata gga cgg tgg tta agc tcc gat ccg gca gga aca atc Gln Pro Trp Ile Gly Arg Trp Leu Ser Ser Asp Pro Ala Gly Thr Ile 645 650 655	1968
gat ggg ctg aat tta tat cgg atg gtg agg aat aat cca gtt acc ctc Asp Gly Leu Asn Leu Tyr Arg Met Val Arg Asn Asn Pro Val Thr Leu 660 665 670	2016
ctt gat cct gat gga tta atg cca aca att gca gaa cgc ata gca gca Leu Asp Pro Asp Gly Leu Met Pro Thr Ile Ala Glu Arg Ile Ala Ala 675 680 685	2064
cta aaa aaa aat aaa gta aca gac tca gcg cct tcg cca gca aat gcc Leu Lys Lys Asn Lys Val Thr Asp Ser Ala Pro Ser Pro Ala Asn Ala 690 695 700	2112
aca aac gta gcg ata aac atc cgc ccg cct gta gca cca aaa cct agc Thr Asn Val Ala Ile Asn Ile Arg Pro Pro Val Ala Pro Lys Pro Ser 705 710 715 720	2160
tta ccg aaa gca tca acg agt agc caa cca acc aca cac cct atc gga Leu Pro Lys Ala Ser Thr Ser Ser Gln Pro Thr Thr His Pro Ile Gly 725 730 735	2208
gct gca aac ata aaa cca acg acg tct ggg tca tct att gtt gct cca Ala Ala Asn Ile Lys Pro Thr Thr Ser Gly Ser Ser Ile Val Ala Pro 740 745 750	2256
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agc gct caa agc agt tct tca agc act acc tcg aca aat cta cag aaa Ser Ala Gln Ser Ser Ser Ser Ser Thr Thr Ser Thr Asn Leu Gln Lys 770 775 780	2352
aaa tca ttt act tta tat aga gca gat aac aga tcc ttt gaa gaa atg	2400

Lys	Ser	Phe	Thr	Leu	Tyr	Arg	Ala	Asp	Asn	Arg	Ser	Phe	Glu	Glu	Met	
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Gln	Ser	Lys	Phe	Pro	Glu	Gly	Phe	Lys	Ala	Trp	Thr	Pro	Leu	Asp	Thr	
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Lys	Met	Ala	Arg	Gln	Phe	Ala	Ser	Ile	Phe	Ile	Gly	Gln	Lys	Asp	Thr	
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tct	aat	tta	cct	aaa	gaa	aca	gtc	aag	aac	ata	agc	aca	tgg	gga	gca	2544
Ser	Asn	Leu	Pro	Lys	Glu	Thr	Val	Lys	Asn	Ile	Ser	Thr	Trp	Gly	Ala	
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Lys	Pro	Lys	Leu	Lys	Asp	Leu	Ser	Asn	Tyr	Ile	Lys	Tyr	Thr	Lys	Asp	
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aaa	tct	aca	gta	tgg	gtt	tct	act	gca	att	aat	act	gaa	gca	ggg	gga	2640
Lys	Ser	Thr	Val	Trp	Val	Ser	Thr	Ala	Ile	Asn	Thr	Glu	Ala	Gly	Gly	
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caa	agc	tca	ggg	gct	cca	ctc	cat	aaa	att	gat	atg	gat	ctc	tac	gag	2688
Gln	Ser	Ser	Gly	Ala	Pro	Leu	His	Lys	Ile	Asp	Met	Asp	Leu	Tyr	Glu	
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ttt	gcc	att	gat	gga	caa	aaa	cta	aat	cca	cta	ccg	gag	ggg	aga	act	2736
Phe	Ala	Ile	Asp	Gly	Gln	Lys	Leu	Asn	Pro	Leu	Pro	Glu	Gly	Arg	Thr	
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Lys	Asn	Met	Val	Pro	Ser	Leu	Leu	Leu	Asp	Thr	Pro	Gln	Ile	Glu	Thr	
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tca	tcc	atc	att	gca	ctt	aat	cat	gga	ccg	gta	aat	gat	gca	gaa	att	2832
Ser	Ser	Ile	Ile	Ala	Leu	Asn	His	Gly	Pro	Val	Asn	Asp	Ala	Glu	Ile	
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tca	ttt	ctg	aca	aca	att	ccg	ctt	aaa	aat	gta	aaa	cct	cat	aag	aga	2880
Ser	Phe	Leu	Thr	Thr	Ile	Pro	Leu	Lys	Asn	Val	Lys	Pro	His	Lys	Arg	
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taa																2883

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Thr Thr Ala Asn Gly Asp Pro Asp Thr Arg Ile Thr Arg His Gln Tyr
35 40 45

Asp Ile His Gly His Leu Asn Gln Ser Ile Asp Pro Arg Leu Tyr Glu
50 55 60

Ala Lys Gln Thr Asn Asn Thr Ile Lys Pro Asn Phe Leu Trp Gln Tyr
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Asp Leu Thr Gly Asn Pro Leu Cys Thr Glu Ser Ile Asp Ala Gly Arg
85 90 95

Thr Val Thr Leu Asn Asp Ile Glu Gly Arg Pro Leu Leu Thr Val Thr
100 105 110

Ala Thr Gly Val Ile Gln Thr Arg Gln Tyr Glu Thr Ser Ser Leu Pro
115 120 125

Gly Arg Leu Leu Ser Val Ala Glu Gln Thr Pro Glu Glu Lys Thr Ser
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Arg Ile Thr Glu Arg Leu Ile Trp Ala Gly Asn Thr Glu Ala Glu Lys
145 150 155 160

Asp His Asn Leu Ala Gly Gln Cys Val Arg His Tyr Asp Thr Ala Gly
165 170 175

Val Thr Arg Leu Glu Ser Leu Ser Leu Thr Gly Thr Val Leu Ser Gln
180 185 190

Ser Ser Gln Leu Leu Ile Asp Thr Gln Glu Ala Asn Trp Thr Gly Asp
195 200 205

Asn Glu Thr Val Trp Gln Asn Met Leu Ala Asp Asp Ile Tyr Thr Thr
210 215 220

Leu Ser Thr Phe Asp Ala Thr Gly Ala Leu Leu Thr Gln Thr Asp Ala
225 230 235 240

Lys Gly Asn Ile Gln Arg Leu Ala Tyr Asp Val Ala Gly Gln Leu Asn

245

250

255

Gly Ser Trp Leu Thr Leu Lys Gly Gln Thr Glu Gln Val Ile Ile Lys
 260 265 270

Ser Leu Thr Tyr Ser Ala Ala Gly Gln Lys Leu Arg Glu Glu His Gly
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Asn Asp Val Ile Thr Glu Tyr Ser Tyr Glu Pro Glu Thr Gln Arg Leu
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Ile Gly Ile Lys Thr Arg Arg Pro Ser Asp Thr Lys Val Leu Gln Asp
 305 310 315 320

Leu Arg Tyr Glu Tyr Asp Pro Val Gly Asn Val Ile Ser Ile Arg Asn
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Asp Ala Glu Ala Thr Arg Phe Trp His Asn Gln Lys Val Met Pro Glu
 340 345 350

Asn Thr Tyr Thr Tyr Asp Ser Leu Tyr Gln Leu Ile Ser Ala Thr Gly
 355 360 365

Arg Glu Met Ala Asn Ile Gly Gln Gln Ser His Gln Phe Pro Ser Pro
 370 375 380

Ala Leu Pro Ser Asp Asn Asn Thr Tyr Thr Asn Tyr Thr Arg Thr Tyr
 385 390 395 400

Thr Tyr Asp Arg Gly Gly Asn Leu Thr Lys Ile Gln His Ser Ser Pro
 405 410 415

Ala Thr Gln Asn Asn Tyr Thr Thr Asn Ile Thr Val Ser Asn Arg Ser
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Asn Arg Ala Val Leu Ser Thr Leu Thr Glu Asp Pro Ala Gln Val Asp
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Ala Leu Phe Asp Ala Gly Gly His Gln Asn Thr Leu Ile Ser Gly Gln
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Asn Leu Asn Trp Asn Thr Arg Gly Glu Leu Gln Gln Val Thr Leu Val
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Lys Arg Asp Lys Gly Ala Asn Asp Asp Arg Glu Trp Tyr Arg Tyr Ser
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Gly Asp Gly Arg Arg Met Leu Lys Ile Asn Glu Gln Gln Ala Ser Asn
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Asn Ala Gln Thr Gln Arg Val Thr Tyr Leu Pro Asn Leu Glu Leu Arg
 515 520 525

Leu Thr Gln Asn Ser Thr Ala Thr Thr Glu Asp Leu Gln Val Ile Thr
 530 535 540

Val Gly Glu Ala Gly Arg Ala Gln Val Arg Val Leu His Trp Glu Ser
 545 550 555 560

Gly Lys Pro Glu Asp Ile Asp Asn Asn Gln Leu Arg Tyr Ser Tyr Asp
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Asn Leu Ile Gly Ser Ser Gln Leu Glu Leu Asp Ser Glu Gly Gln Ile
 580 585 590

Ile Ser Glu Glu Glu Tyr Tyr Pro Tyr Gly Gly Thr Ala Leu Trp Ala
 595 600 605

Ala Arg Asn Gln Thr Glu Ala Ser Tyr Lys Thr Ile Arg Tyr Ser Gly
 610 615 620

Lys Glu Arg Asp Ala Thr Gly Leu Tyr Tyr Tyr Gly Tyr Arg Tyr Tyr
 625 630 635 640

Gln Pro Trp Ile Gly Arg Trp Leu Ser Ser Asp Pro Ala Gly Thr Ile
 645 650 655

Asp Gly Leu Asn Leu Tyr Arg Met Val Arg Asn Asn Pro Val Thr Leu
 660 665 670

Leu Asp Pro Asp Gly Leu Met Pro Thr Ile Ala Glu Arg Ile Ala Ala
 675 680 685

Leu Lys Lys Asn Lys Val Thr Asp Ser Ala Pro Ser Pro Ala Asn Ala
 690 695 700

Thr Asn Val Ala Ile Asn Ile Arg Pro Pro Val Ala Pro Lys Pro Ser
705 710 715 720

Leu Pro Lys Ala Ser Thr Ser Ser Gln Pro Thr Thr His Pro Ile Gly
725 730 735

Ala Ala Asn Ile Lys Pro Thr Thr Ser Gly Ser Ser Ile Val Ala Pro
740 745 750

Leu Ser Pro Val Gly Asn Lys Ser Thr Ser Glu Ile Ser Leu Pro Glu
755 760 765

Ser Ala Gln Ser Ser Ser Ser Ser Thr Thr Ser Thr Asn Leu Gln Lys
770 775 780

Lys Ser Phe Thr Leu Tyr Arg Ala Asp Asn Arg Ser Phe Glu Glu Met
785 790 795 800

Gln Ser Lys Phe Pro Glu Gly Phe Lys Ala Trp Thr Pro Leu Asp Thr
805 810 815

Lys Met Ala Arg Gln Phe Ala Ser Ile Phe Ile Gly Gln Lys Asp Thr
820 825 830

Ser Asn Leu Pro Lys Glu Thr Val Lys Asn Ile Ser Thr Trp Gly Ala
835 840 845

Lys Pro Lys Leu Lys Asp Leu Ser Asn Tyr Ile Lys Tyr Thr Lys Asp
850 855 860

Lys Ser Thr Val Trp Val Ser Thr Ala Ile Asn Thr Glu Ala Gly Gly
865 870 875 880

Gln Ser Ser Gly Ala Pro Leu His Lys Ile Asp Met Asp Leu Tyr Glu
885 890 895

Phe Ala Ile Asp Gly Gln Lys Leu Asn Pro Leu Pro Glu Gly Arg Thr
900 905 910

Lys Asn Met Val Pro Ser Leu Leu Leu Asp Thr Pro Gln Ile Glu Thr
915 920 925

Ser Ser Ile Ile Ala Leu Asn His Gly Pro Val Asn Asp Ala Glu Ile
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<213> Xenorhabdus bovienii

<400> 49

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Gly Pro Asp Gly Met Ala Ser Leu Ser Val Pro Leu Pro Ile Ser Ala
 35 40 45

Gly Arg Gly Gly Ala Pro Asn Leu Ser Leu Asn Tyr Ser Ser Gly Ala
 50 55 60

Gly Asn Gly Ser Phe Gly Ile Gly Trp Gln Ser Ser Thr Met Ala Ile
 65 70 75 80

Ser Arg Arg Thr Gln His Gly Val Pro Gln Tyr His Gly Glu Asp Thr
 85 90 95

Phe Leu Cys Pro Met Gly Glu Val Met Ala Val Ala Val Asn Gln Ser
 100 105 110

Gly Gln Pro Asp Val Arg Lys Thr Asp Lys Leu Leu Gly Gly Gln Leu
 115 120 125

Pro Val Thr Tyr Thr Val Thr Arg His Gln Pro Arg Asn Ile Gln His
 130 135 140

Phe Ser Lys Leu Glu Tyr Trp Gln Pro Pro Thr Asp Val Glu Thr Thr
 145 150 155 160

Pro Phe Trp Leu Met Tyr Ser Pro Asp Gly Gln Ile His Ile Phe Gly
 165 170 175

Lys Thr Glu Gln Ala Gln Ile Ala Asn Pro Ala Glu Val Ser Gln Ile
 180 185 190

Ala Gln Trp Leu Leu Glu Glu Thr Val Thr Pro Ala Gly Glu His Ile
 195 200 205

Tyr Tyr Gln Tyr Arg Ala Glu Asp Asp Ile Gly Cys Asp Asp Ser Glu
 210 215 220

Lys Asn Ala His Pro Asn Ala Ser Ala Gln Arg Tyr Leu Thr Gln Val
 225 230 235 240

Asn Tyr Gly Asn Ile Thr Pro Glu Ser Ser Leu Leu Val Leu Lys Asn
 245 250 255

Thr Pro Pro Ala Asp Asn Glu Trp Leu Phe His Leu Val Phe Asp Tyr
 260 265 270

Gly Glu Arg Ala Gln Glu Ile Asn Thr Val Pro Pro Phe Lys Ala Pro
 275 280 285

Ser Asn Asn Trp Lys Ile Arg Pro Asp Arg Phe Ser Arg Phe Glu Tyr
 290 295 300

Gly Phe Glu Val Arg Thr Arg Arg Leu Cys Gln Gln Ile Leu Met Phe
 305 310 315 320

His Arg Leu Lys Ser Leu Ala Gly Glu Gln Ile Asp Gly Glu Glu Ile
 325 330 335

Pro Ala Leu Val Ala Arg Leu Leu Leu Ser Tyr Asp Leu Asn Asp Ser
 340 345 350

Val Thr Thr Leu Thr Ala Ile Arg Gln Met Ala Tyr Glu Thr Asp Ala
 355 360 365

Thr Leu Ile Ala Leu Pro Pro Leu Glu Phe Asp Tyr Gln Pro Phe Glu
 370 375 380

Ala Lys Val Thr Gln Lys Trp Gln Glu Met Pro Gln Leu Ala Gly Leu
 385 390 395 400

Asn Ala Gln Gln Pro Tyr Gln Leu Val Asp Leu Tyr Gly Glu Gly Ile
 405 410 415

Ser Gly Ile Leu Tyr Gln Asp Arg Pro Gly Ala Trp Trp Tyr Gln Ala
 420 425 430

Pro Ile Arg Gln Lys Asn Val Glu Asp Ile Asn Ala Val Thr Tyr Ser
 435 440 445

Pro Ile Asn Pro Leu Pro Lys Ile Pro Ser Gln Gln Asp Arg Ala Thr
 450 455 460

Leu Met Asp Ile Asp Gly Asp Gly His Leu Asp Trp Val Ile Ala Gly
 465 470 475 480

Ala Gly Ile Gln Gly Arg Tyr Ser Met Gln Pro Asn Gly Glu Trp Thr
 485 490 495

His Phe Ile Pro Ile Ser Ala Leu Pro Thr Glu Tyr Phe His Pro Gln
 500 505 510

Ala Gln Leu Ala Asp Leu Val Gly Ala Gly Leu Ser Asp Leu Ala Leu
 515 520 525

Ile Gly Pro Arg Ser Val Arg Leu Tyr Ala Asn Asp Arg Gly Asn Trp
 530 535 540

Lys Ala Gly Ile Asn Val Met Pro Pro Asp Gly Val Asn Leu Pro Ile
 545 550 555 560

Phe Gly Gly Asp Ala Ser Ser Leu Val Ala Phe Ser Asp Met Leu Gly
 565 570 575

Ser Gly Gln Gln His Leu Val Glu Ile Ala Ala Gln Ser Val Lys Cys
 580 585 590

Trp Pro Asn Leu Gly His Gly Arg Phe Gly Ala Ala Ile Leu Leu Pro
 595 600 605

Gly Phe Ser Gln Pro Asn Gly Thr Phe Asn Ala Asn Gln Val Phe Leu
 610 615 620

Ala Asp Ile Asp Gly Ser Gly Thr Ala Asp Ile Ile Tyr Ala His Ser
 625 630 635 640

Thr Tyr Leu Asp Ile Tyr Leu Asn Glu Ser Gly Asn Arg Phe Ser Ala
 645 650 655

Pro Val Arg Leu Asn Leu Pro Glu Gly Val Met Phe Asp Asn Thr Cys
 660 665 670

Gln Leu Gln Val Ser Asp Ile Gln Gly Leu Gly Ala Ala Ser Ile Val
675 680 685

Leu Thr Val Pro His Met Thr Pro Arg His Trp Arg Tyr Asp Phe Thr
690 695 700

His Asn Lys Pro Trp Leu Leu Asn Val Ile Asn Asn Asn Arg Gly Ala
705 710 715 720

Glu Thr Thr Leu Phe Tyr Arg Ser Ser Ala Gln Phe Trp Leu Asp Glu
725 730 735

Lys Ser Gln Ile Glu Glu Leu Gly Lys Phe Ala Ala Ser Tyr Leu Pro
740 745 750

Phe Pro Ile His Leu Leu Trp Arg Asn Glu Ala Leu Asp Glu Ile Thr
755 760 765

Gly Asn Arg Leu Thr Lys Val Met Asn Tyr Ala His Gly Ala Trp Asp
770 775 780

Gly Arg Glu Arg Glu Phe Cys Gly Phe Gly Arg Val Thr Gln Ile Asp
785 790 795 800

Thr Asp Glu Phe Ala Lys Gly Thr Thr Glu Lys Ala Pro Asp Glu Asn
805 810 815

Ile Tyr Pro Ser Arg Ser Ile Ser Trp Phe Ala Thr Gly Leu Pro Glu
820 825 830

Val Asp Ser Gln Leu Pro Ala Glu Tyr Trp Arg Gly Asp Asp Gln Ala
835 840 845

Phe Ala Gly Phe Thr Pro Arg Phe Thr Arg Tyr Glu Lys Gly Asn Ala
850 855 860

Gly Gln Glu Gly Gln Asp Thr Pro Ile Lys Glu Pro Thr Glu Thr Glu
865 870 875 880

Ala Tyr Trp Leu Asn Arg Ala Met Lys Gly Gln Leu Leu Arg Ser Glu
885 890 895

Val Tyr Gly Asp Asp Lys Thr Glu Lys Ala Lys Ile Pro Tyr Thr Val

900

905

910

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Ala Pro Ser Ser Trp Thr Ser Ile Ile Glu Asn Arg Ser Tyr His Tyr
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Glu Arg Ile Val Val Asp Pro Ser Cys Lys Gln Gln Val Val Leu Lys
 945 950 955 960

Ala Asp Glu Tyr Gly Phe Pro Leu Ala Lys Val Asp Ile Ala Tyr Pro
 965 970 975

Arg Arg Asn Lys Pro Ala Gln Asn Pro Tyr Pro Asp Ser Leu Pro Asp
 980 985 990

Thr Leu Phe Ala Asp Ser Tyr Asp Asp Gln Gln Lys Gln Leu Tyr Leu
 995 1000 1005

Thr Lys Gln Gln Gln Ser Tyr Tyr His Leu Thr Gln Gln Asp Asp
 1010 1015 1020

Trp Val Leu Gly Leu Thr Asp Ser Arg Tyr Ser Glu Val Tyr His
 1025 1030 1035

Tyr Ala Gln Thr Asp Ala Gln Ser Asp Ile Pro Lys Ala Gly Leu
 1040 1045 1050

Ile Leu Glu Asp Leu Leu Lys Val Asp Gly Leu Ile Gly Lys Asp
 1055 1060 1065

Lys Thr Phe Ile Tyr Leu Gly Gln Gln Arg Val Ala Tyr Val Gly
 1070 1075 1080

Gly Asp Ala Glu Lys Pro Thr Arg Gln Val Arg Val Ala Tyr Thr
 1085 1090 1095

Glu Thr Ala Ala Phe Asp Asp Asn Ala Leu His Ala Phe Asp Gly
 1100 1105 1110

Val Ile Ala Pro Asp Glu Leu Thr Gln Gln Leu Leu Ala Gly Gly
 1115 1120 1125

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Lys	Val	Trp	Val	Ala	Arg	Gln	Gly	Tyr	Thr	Glu	Tyr	Gly	Ser	Ala
1145						1150					1155			
Ala	Gln	Phe	Tyr	Arg	Pro	Leu	Ile	Gln	Arg	Lys	Ser	Leu	Leu	Thr
1160						1165					1170			
Gly	Lys	Tyr	Thr	Leu	Ser	Trp	Asp	Thr	His	Tyr	Cys	Val	Val	Val
1175						1180					1185			
Lys	Thr	Glu	Asp	Gly	Ala	Gly	Met	Thr	Thr	Gln	Ala	Lys	Tyr	Asp
1190						1195					1200			
Tyr	Arg	Phe	Leu	Leu	Pro	Ala	Gln	Leu	Thr	Asp	Ile	Asn	Asp	Asn
1205						1210					1215			
Gln	His	Ile	Val	Thr	Phe	Asn	Ala	Leu	Gly	Gln	Val	Thr	Ser	Ser
1220						1225					1230			
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1235						1240					1245			
Pro	Glu	Ser	Lys	Pro	Phe	Thr	Val	Pro	Asp	Thr	Val	Glu	Lys	Ala
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Leu	Ala	Leu	Gln	Pro	Thr	Ile	Pro	Val	Ser	Gln	Cys	Asn	Ile	Tyr
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Val	Pro	Asp	Ser	Trp	Met	Arg	Leu	Leu	Pro	Gln	Gln	Ser	Leu	Thr
1280						1285					1290			
Gly	Gln	Leu	Lys	Glu	Gly	Glu	Thr	Leu	Trp	Asn	Ala	Leu	His	Arg
1295						1300					1305			
Ala	Gly	Val	Val	Thr	Glu	Asp	Gly	Leu	Ile	Cys	Glu	Leu	Ala	Tyr
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1325						1330					1335			

Thr Leu Gln Gln Ile Leu Ala Gln Thr Pro Arg Gln Pro Pro His
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Ala Met Thr Ile Thr Thr Asp Arg Tyr Asp Ser Asp Ser Gln Gln
 1355 1360 1365

Gln Leu Arg Gln Ser Ile Val Leu Ser Asp Gly Phe Gly Arg Val
 1370 1375 1380

Leu Gln Ser Ala Gln Arg His Glu Ala Gly Glu Ala Trp Gln Arg
 1385 1390 1395

Ala Glu Asp Gly Ser Leu Val Val Asp Asn Thr Gly Lys Pro Val
 1400 1405 1410

Val Ala Asn Thr Thr Thr Arg Trp Ala Val Ser Gly Arg Thr Glu
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Tyr Asp Gly Lys Gly Gln Ala Ile Arg Ala Tyr Leu Pro Tyr Tyr
 1430 1435 1440

Leu Asn Asp Trp Arg Tyr Val Ser Asp Asp Ser Ala Arg Asp Asp
 1445 1450 1455

Leu Tyr Ala Asp Thr His Phe Tyr Asp Pro Leu Gly Arg Glu Tyr
 1460 1465 1470

Gln Val Lys Thr Ala Lys Gly Phe Trp Arg Glu Asn Met Phe Met
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Pro Trp Phe Val Val Asn Glu Asp Glu Asn Asp Thr Ala Ala Arg
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Leu Thr Ser
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<400> 51

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Ser Pro His Asn Phe Leu Ile Glu Ser Ile Asp Pro Arg Leu Phe Asp
50 55 60

Leu Gln Ser Gln Ser Thr Ile Lys Pro Asn Phe Thr Tyr Cys Pro Ala
65 70 75 80

Leu Lys Gly Asp Val Leu Arg Thr Glu Ser Val Asp Ala Gly Gln Thr
85 90 95

Val Ile Leu Ser Asp Ile Glu Gly Arg Pro Leu Leu Asn Ile Ser Ala
100 105 110

Met Gly Val Val Lys His Trp Gln Tyr Glu Glu Ser Thr Leu Pro Gly
115 120 125

Arg Leu Leu Ala Val Ser Glu Arg Lys Asn Glu Ala Ser Thr Pro Gln
130 135 140

Ile Ile Glu Arg Phe Ile Trp Ser Gly Asn Ser Pro Ser Glu Lys Asp
145 150 155 160

His Asn Leu Ala Gly Lys Tyr Leu Arg His Tyr Asp Thr Ala Gly Leu
165 170 175

Asn Gln Leu Asn Ala Val Ser Leu Thr Ser Val Asp Leu Ser Gln Ser
180 185 190

Arg Gln Leu Leu Gln Asp Asp Val Thr Ala Asp Trp Ser Gly Ser Asp
195 200 205

Glu Ser Gln Trp Lys Thr Arg Leu Ser Asn Asp Ile Phe Thr Thr Glu
210 215 220

Ile Thr Ala Asp Ala Val Gly Asn Phe Leu Thr Gln Asn Asp Ala Lys
225 230 235 240

Ser Asn Gln Gln Arg Leu Ser Tyr Asp Val Ala Gly Gln Leu Lys Ala
245 250 255

Ser Trp Leu Thr Ile Lys Gly Gln Asn Glu Gln Val Ile Val Asn Ser
260 265 270

Leu Thr Tyr Ser Ala Ala Gly Gln Lys Leu Arg Glu Glu Gln Gly Asn
 275 280 285

Gly Val Val Thr Glu Tyr Ser Tyr Glu Ala Gln Thr Trp Arg Leu Ile
 290 295 300

Gly Val Thr Ala Tyr Arg Gln Ser Asp Lys Lys Arg Leu Gln Asp Leu
 305 310 315 320

Val Tyr Asn Tyr Asp Pro Val Gly Asn Leu Leu Asn Ile Arg Asn Asn
 325 330 335

Ala Glu Ala Thr Arg Phe Trp Arg Asn Gln Ile Val Glu Pro Glu Asn
 340 345 350

His Tyr Ala Tyr Asp Ser Leu Tyr Gln Leu Ile Ser Ala Ser Gly Arg
 355 360 365

Glu Ile Ala Ser Ile Gly Gln Gln Gly Ser Arg Leu Pro Val Pro Ile
 370 375 380

Ile Pro Leu Pro Ala Asn Asp Asp Val Tyr Thr Arg Tyr Thr Arg Thr
 385 390 395 400

Tyr His Tyr Asp Arg Gly Gly Asn Leu Cys Gln Ile Arg His Cys Ala
 405 410 415

Pro Ala Thr Asp Asn Lys Tyr Thr Thr Lys Ile Thr Val Ser Asn Arg
 420 425 430

Ser Asn Arg Ala Val Trp Asp Thr Leu Thr Thr Asp Pro Ala Lys Val
 435 440 445

Asp Thr Leu Phe Asp His Gly Gly His Gln Leu Gln Leu Gln Ser Gly
 450 455 460

Gln Thr Leu Cys Trp Asn Tyr Arg Gly Glu Leu Gln Gln Ile Thr Lys
 465 470 475 480

Ile Gln Arg Asp Glu Lys Pro Ala Asp Lys Glu Arg Tyr Arg Tyr Gly
 485 490 495

Val Gly Ala Ala Arg Val Val Lys Ile Ser Thr Gln Gln Ala Gly Gly
500 505 510

Ser Ser His Val Gln Arg Val Val Tyr Leu Pro Gly Leu Glu Leu Arg
515 520 525

Thr Thr Gln His Asp Ala Thr Leu Ile Glu Asp Leu Gln Val Ile Ile
530 535 540

Met Gly Glu Ala Gly Arg Ala Gln Val Arg Val Leu His Trp Glu Ile
545 550 555 560

Pro Pro Pro Asp Asn Leu Asn Asn Asp Ser Leu Arg Tyr Ser Tyr Asp
565 570 575

Ser Leu Met Gly Ser Ser Gln Leu Glu Leu Asp Gly Ala Gly Gln Ile
580 585 590

Ile Thr Gln Glu Glu Tyr Tyr Pro Tyr Gly Gly Thr Ala Ile Trp Ala
595 600 605

Ala Arg Asn Gln Thr Glu Ala Asn Tyr Lys Thr Ile Arg Tyr Ser Gly
610 615 620

Lys Glu Arg Asp Ala Thr Gly Leu Tyr Tyr Tyr Gly His Arg Tyr Tyr
625 630 635 640

Gln Pro Trp Leu Gly Arg Trp Leu Ser Ala Asp Pro Ala Gly Thr Val
645 650 655

Asp Gly Leu Asn Leu Tyr Arg Met Val Arg Asn Asn Pro Ile Thr Tyr
660 665 670

Arg Asp Ala Asp Gly Leu Ala Pro Ile Gly Asp Lys Ile Ser Glu Gly
675 680 685

Ile Tyr Glu Pro Glu Leu Arg Val Gly Leu Glu Arg Asp Asp Pro Asn
690 695 700

Val Arg Asp Tyr Asp Arg Val Tyr Pro Asp Thr Ala Lys Thr Glu Met
705 710 715 720

Ile Glu Ala Thr Ala Thr Thr Ile Ala Pro Ser Gln Met Leu Ser Ala

725

730

735

His Ala Phe Ala Ser Val Pro Ile Leu Thr Asp Leu Phe Asn Pro Gln
 740 745 750

Thr Ala Arg Leu Ser Gln Lys Thr Thr Asp Ile Val Leu Asn Thr Gln
 755 760 765

Gly Gly Gly Asp Leu Ile Phe Thr Gly Met Asn Ile Lys Gly Lys Gly
 770 775 780

Lys Glu Phe Asn Ala Leu Lys Ile Val Asp Thr Tyr Gly Gly Glu Met
 785 790 795 800

Pro Asp Ser Lys Thr Ala Ile Ser Ala Tyr Trp Leu Pro Gln Gly Gly
 805 810 815

Tyr Thr Asp Ile Pro Ile His Pro Thr Gly Ile Gln Lys Tyr Leu Phe
 820 825 830

Thr Pro Ala Phe Ser Gly Cys Thr Leu Ala Val Asp Lys Leu Asn Glu
 835 840 845

Asn Thr Leu Arg Ala Tyr His Val Glu Gly Ser Lys Glu Asp Ala Gln
 850 855 860

Tyr Asn Asn Leu Ala Val Ala Ala His Gly Glu Gly Leu Val Met Ala
 865 870 875 880

Met Glu Phe Pro Asp Tyr Gly Phe His Thr Asp Lys Thr Gly Gln Arg
 885 890 895

Leu Arg Asn Thr Gln Gly Phe Ala Phe Met Ser Tyr Asn Gln Ser Gln
 900 905 910

Lys Lys Trp Glu Ile His Tyr Gln Arg Gln Ala Leu Thr Ser Asn Thr
 915 920 925

Gly Ile Met Asn Val Ser Ala Lys Asn Lys Ile Arg Leu Asn Ala Pro
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Ser His Val Lys Asn Ser Ser Ile Lys Gly Thr Glu Ile Met Thr Thr
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His Phe

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 Gly Gly Gly Ala Ile Asn Gly Met Gly Glu Ala Leu Asn Ala Ala Gly
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 cct gat gga atg gcc tcc cta tct ctg cca tta ccc ctt tcg acc ggc 144
 Pro Asp Gly Met Ala Ser Leu Ser Leu Pro Leu Pro Leu Ser Thr Gly
 35 40 45
 aga ggg acg gct cct gga tta tcg ctg att tac agc aac agt gca ggt 192
 Arg Gly Thr Ala Pro Gly Leu Ser Leu Ile Tyr Ser Asn Ser Ala Gly
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 aat ggg cct ttc ggc atc ggc tgg caa tgc ggt gtt atg tcc att agc 240
 Asn Gly Pro Phe Gly Ile Gly Trp Gln Cys Gly Val Met Ser Ile Ser
 65 70 75 80
 cga cgc acc caa cat ggc att cca caa tac ggt aat gac gac acg ttc 288
 Arg Arg Thr Gln His Gly Ile Pro Gln Tyr Gly Asn Asp Asp Thr Phe
 85 90 95
 cta tcc cca caa ggc gag gtc atg aat atc gcc ctg aat gac caa ggg 336
 Leu Ser Pro Gln Gly Glu Val Met Asn Ile Ala Leu Asn Asp Gln Gly
 100 105 110
 caa cct gat atc cgt caa gac gtt aaa acg ctg caa ggc gtt acc ttg 384
 Gln Pro Asp Ile Arg Gln Asp Val Lys Thr Leu Gln Gly Val Thr Leu
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 Pro Ile Ser Tyr Thr Val Thr Arg Tyr Gln Ala Arg Gln Ile Leu Asp
 130 135 140
 ttc agt aaa atc gaa tac tgg caa cct gcc tcc ggt caa gaa gga cgc 480

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Ala	Phe	Trp	Leu	Ile	Ser	Ser	Pro	Asp	Gly	Gln	Leu	His	Ile	Leu	Gly	
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Lys	Thr	Ala	Gln	Ala	Cys	Leu	Ala	Asn	Pro	Gln	Asn	Asp	Gln	Gln	Ile	
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gcc	cag	tgg	ttg	ctg	gaa	gaa	act	gtg	acg	cca	gcc	ggg	gaa	cat	gtc	624
Ala	Gln	Trp	Leu	Leu	Glu	Glu	Thr	Val	Thr	Pro	Ala	Gly	Glu	His	Val	
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Ser	Tyr	Gln	Tyr	Arg	Ala	Glu	Asp	Glu	Ala	His	Cys	Asp	Asp	Asn	Glu	
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Lys	Thr	Ala	His	Pro	Asn	Val	Thr	Ala	Gln	Arg	Tyr	Leu	Val	Gln	Val	
225					230					235					240	
aac	tac	ggc	aac	atc	aaa	cca	caa	gcc	agc	ctg	ttc	gta	ctg	gat	aac	768
Asn	Tyr	Gly	Asn	Ile	Lys	Pro	Gln	Ala	Ser	Leu	Phe	Val	Leu	Asp	Asn	
			245					250						255		
gca	cct	ccc	gca	ccg	gaa	gag	tgg	ctg	ttt	cat	ctg	gtc	ttt	gac	cac	816
Ala	Pro	Pro	Ala	Pro	Glu	Glu	Trp	Leu	Phe	His	Leu	Val	Phe	Asp	His	
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Gly	Glu	Arg	Asp	Thr	Ser	Leu	His	Thr	Val	Pro	Thr	Trp	Asp	Ala	Gly	
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Thr	Ala	Gln	Trp	Ser	Val	Arg	Pro	Asp	Ile	Phe	Ser	Arg	Tyr	Glu	Tyr	
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Gly	Phe	Glu	Val	Arg	Thr	Arg	Arg	Leu	Cys	Gln	Gln	Val	Leu	Met	Phe	
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His	Arg	Thr	Ala	Leu	Met	Ala	Gly	Glu	Ala	Ser	Thr	Asn	Asp	Ala	Pro	
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gaa	ctg	gtt	gga	cgc	tta	ata	ctg	gaa	tat	gac	aaa	aac	gcc	agc	gtc	1056
Glu	Leu	Val	Gly	Arg	Leu	Ile	Leu	Glu	Tyr	Asp	Lys	Asn	Ala	Ser	Val	
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acc	acg	ttg	att	acc	atc	cgt	caa	tta	agc	cat	gaa	tcg	gac	ggc	agc	1104
Thr	Thr	Leu	Ile	Thr	Ile	Arg	Gln	Leu	Ser	His	Glu	Ser	Asp	Gly	Ser	
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Pro	Val	Thr	Gln	Pro	Pro	Leu	Glu	Leu	Ala	Trp	Gln	Arg	Phe	Asp	Leu	

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Glu Lys Met Pro Thr Trp Gln Arg Phe Asp Ala Leu Asp Asn Phe Asn			
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tcg cag caa cgt tat caa ctg gtt gat ctg cgg gga gaa ggg ttg cca			1248
Ser Gln Gln Arg Tyr Gln Leu Val Asp Leu Arg Gly Glu Gly Leu Pro			
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ggt atg ctg tat caa gat cga ggc gct tgg tgg tat aaa gct ccg caa			1296
Gly Met Leu Tyr Gln Asp Arg Gly Ala Trp Trp Tyr Lys Ala Pro Gln			
	420	425	430
cgt cag gaa gac gga gac agc aat gcc gtc act tac gac aaa atc gcc			1344
Arg Gln Glu Asp Gly Asp Ser Asn Ala Val Thr Tyr Asp Lys Ile Ala			
	435	440	445
cca ctg cct acc cta ccc aat ttg cag gat aat gcc tca ttg atg gat			1392
Pro Leu Pro Thr Leu Pro Asn Leu Gln Asp Asn Ala Ser Leu Met Asp			
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atc aac gga gac ggc caa ctg gat tgg gtt gtt acc gcc tcc ggt att			1440
Ile Asn Gly Asp Gly Gln Leu Asp Trp Val Val Thr Ala Ser Gly Ile			
	465	470	480
cgc gga tac cat agt cag caa ccc gat gga aag tgg acg cac ttt acg			1488
Arg Gly Tyr His Ser Gln Gln Pro Asp Gly Lys Trp Thr His Phe Thr			
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cca atc aat gcc ttg ccc gtg gaa tat ttt cat cca agc atc cag ttc			1536
Pro Ile Asn Ala Leu Pro Val Glu Tyr Phe His Pro Ser Ile Gln Phe			
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gct gac ctt acc ggg gca ggc tta tct gat tta gtg ttg atc ggg ccg			1584
Ala Asp Leu Thr Gly Ala Gly Leu Ser Asp Leu Val Leu Ile Gly Pro			
	515	520	525
aaa agc gtg cgt cta tat gcc aac cag cga aac ggc tgg cgt aaa gga			1632
Lys Ser Val Arg Leu Tyr Ala Asn Gln Arg Asn Gly Trp Arg Lys Gly			
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gaa gat gtc ccc caa tcc aca ggt atc acc ctg cct gtc aca ggg acc			1680
Glu Asp Val Pro Gln Ser Thr Gly Ile Thr Leu Pro Val Thr Gly Thr			
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gat gcc cgc aaa ctg gtg gct ttc agt gat atg ctc ggt tcc ggt caa			1728
Asp Ala Arg Lys Leu Val Ala Phe Ser Asp Met Leu Gly Ser Gly Gln			
	565	570	575
caa cat ctg gtg gaa atc aag gct aat cgc gtc acc tgt tgg ccg aat			1776
Gln His Leu Val Glu Ile Lys Ala Asn Arg Val Thr Cys Trp Pro Asn			
	580	585	590
cta ggg cat ggc cgt ttc ggt caa cca cta act ctg tca gga ttt agc			1824
Leu Gly His Gly Arg Phe Gly Gln Pro Leu Thr Leu Ser Gly Phe Ser			
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tta gcg ttg cca gaa ggc gta caa ttt gac aac act tgc caa ctt caa Leu Ala Leu Pro Glu Gly Val Gln Phe Asp Asn Thr Cys Gln Leu Gln 660 665 670	2016
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cca cat atc gcg cca cat cac tgg cgt tgt gac ctg tca ctg acc aaa Pro His Ile Ala Pro His His Trp Arg Cys Asp Leu Ser Leu Thr Lys 690 695 700	2112
ccc tgg ttg ttg aat gta atg aac aat aac cgg ggc gca cat cac acg Pro Trp Leu Leu Asn Val Met Asn Asn Asn Arg Gly Ala His His Thr 705 710 715 720	2160
cta cat tat cgt agt tcc gcg caa ttc tgg ttg gat gaa aaa tta cag Leu His Tyr Arg Ser Ser Ala Gln Phe Trp Leu Asp Glu Lys Leu Gln 725 730 735	2208
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att gcc tgg ccg cgc cgc gaa aaa cca gca gtg aat ccc tac ccg cct Ile Ala Trp Pro Arg Arg Glu Lys Pro Ala Val Asn Pro Tyr Pro Pro 965 970 975	2928
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Leu Thr Gly Lys Thr Thr Leu Thr Trp Asp Thr His His Cys Val	
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Ile Ile Gln Thr Gln Asp Ala Ala Gly Leu Thr Thr Gln Ala His	
1175 1180 1185	
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Asp Asn Gln His Ile Val Thr Leu Asp Ala Leu Gly Arg Val Thr	
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Ser Gln Glu Glu Ala Glu Ala Leu Trp Ala Gln Leu Arg Ala Ala			
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His Met Ile Thr Glu Asp Gly Lys Val Cys Ala Leu Ser Gly Lys			
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Arg Gly Thr Ser His Gln Asn Leu Thr Ile Gln Leu Ile Ser Leu			
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Leu Ala Ser Ile Pro Arg Leu Pro Pro His Val Leu Gly Ile Thr			
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Thr Asp Arg Tyr Asp Ser Asp Pro Gln Gln Gln His Gln Gln Thr			
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gtg agc ttt agt gac ggt ttt ggc cgg tta ctc cag agt tca gct			4104
Val Ser Phe Ser Asp Gly Phe Gly Arg Leu Leu Gln Ser Ser Ala			
1355	1360	1365	
cgt cat gag tca ggt gat gcc tgg caa cgt aaa gag gat ggc ggg			4149
Arg His Glu Ser Gly Asp Ala Trp Gln Arg Lys Glu Asp Gly Gly			
1370	1375	1380	
ctg gtc gtg gat gca aat ggc gtt ctg gtc agt gcc cct aca gac			4194
Leu Val Val Asp Ala Asn Gly Val Leu Val Ser Ala Pro Thr Asp			
1385	1390	1395	
acc cga tgg gcc gtt tcc ggt cgc aca gaa tat gac gac aaa ggc			4239
Thr Arg Trp Ala Val Ser Gly Arg Thr Glu Tyr Asp Asp Lys Gly			
1400	1405	1410	
caa cct gtg cgt act tat caa ccc tat ttt cta aat gac tgg cgt			4284
Gln Pro Val Arg Thr Tyr Gln Pro Tyr Phe Leu Asn Asp Trp Arg			
1415	1420	1425	
tac gtt agt gat gac agc gca cga gat gac ctg ttt gcc gat acc			4329
Tyr Val Ser Asp Asp Ser Ala Arg Asp Asp Leu Phe Ala Asp Thr			
1430	1435	1440	
cac ctt tat gat cca ttg gga cgg gaa tac aaa gtc atc act gct			4374
His Leu Tyr Asp Pro Leu Gly Arg Glu Tyr Lys Val Ile Thr Ala			
1445	1450	1455	
aag aaa tat ttg cga gaa aag ctg tac acc ccg tgg ttt att gtc			4419
Lys Lys Tyr Leu Arg Glu Lys Leu Tyr Thr Pro Trp Phe Ile Val			
1460	1465	1470	
agt gag gat gaa aac gat aca gca tca aga acc cca tag			4458
Ser Glu Asp Glu Asn Asp Thr Ala Ser Arg Thr Pro			
1475	1480	1485	

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 <213> Photorhabdus luminescens strain W14

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 1 5 10 15
 gtt cac gat aac cgt gga cta gct atc cgt aat att agt ttt cac cgc 96
 Val His Asp Asn Arg Gly Leu Ala Ile Arg Asn Ile Ser Phe His Arg
 20 25 30
 act acc gca gaa gca aat acc gat acc cgt att acc cgc cat caa tat 144
 Thr Thr Ala Glu Ala Asn Thr Asp Thr Arg Ile Thr Arg His Gln Tyr
 35 40 45
 aat gcc ggc gga tat ttg aac caa agc att gat cct cgc ctg tat gac 192
 Asn Ala Gly Gly Tyr Leu Asn Gln Ser Ile Asp Pro Arg Leu Tyr Asp
 50 55 60
 gcc aaa cag act aac aac gct gta caa ccg aat ttt atc tgg cga cat 240
 Ala Lys Gln Thr Asn Asn Ala Val Gln Pro Asn Phe Ile Trp Arg His
 65 70 75 80
 aat ttg acc ggc aat atc ctg cga aca gag agc gtc gat gcc ggt cgg 288
 Asn Leu Thr Gly Asn Ile Leu Arg Thr Glu Ser Val Asp Ala Gly Arg
 85 90 95
 acg att acc ctc aac gat att gaa ggc cgc ccg gtg ttg acc atc aat 336
 Thr Ile Thr Leu Asn Asp Ile Glu Gly Arg Pro Val Leu Thr Ile Asn
 100 105 110
 gca gcc ggt gtc cgc caa aac cat cgc tac gaa gat aac acc ctg ccc 384
 Ala Ala Gly Val Arg Gln Asn His Arg Tyr Glu Asp Asn Thr Leu Pro
 115 120 125
 ggt cgc ctg ctc gct atc agc gaa caa gga cag gca gaa gag aaa acg 432
 Gly Arg Leu Leu Ala Ile Ser Glu Gln Gly Gln Ala Glu Glu Lys Thr
 130 135 140
 acc gag cgc ctt atc tgg gcc ggc aat acg ccg caa gaa aaa gac cac 480
 Thr Glu Arg Leu Ile Trp Ala Gly Asn Thr Pro Gln Glu Lys Asp His
 145 150 155 160
 aac ctt gcc ggt cag tgc gtc cgc cat tac gat acc gca gga ctc act 528
 Asn Leu Ala Gly Gln Cys Val Arg His Tyr Asp Thr Ala Gly Leu Thr
 165 170 175

caa ctc aac agc ctt gcc ctg acc ggc gcc gtt cta tca caa tct caa Gln Leu Asn Ser Leu Ala Leu Thr Gly Ala Val Leu Ser Gln Ser Gln 180 185 190	576
caa ctg ctt acc gat aac cag gat gcc gac tgg aca ggt gaa gac cag Gln Leu Leu Thr Asp Asn Gln Asp Ala Asp Trp Thr Gly Glu Asp Gln 195 200 205	624
agc ctc tgg caa caa aaa ctg agt agt gat gtc tat atc acc caa agt Ser Leu Trp Gln Gln Lys Leu Ser Ser Asp Val Tyr Ile Thr Gln Ser 210 215 220	672
aac act gat gcc acc ggg gct tta ctg acc cag acc gat gcc aaa ggc Asn Thr Asp Ala Thr Gly Ala Leu Leu Thr Gln Thr Asp Ala Lys Gly 225 230 235 240	720
aac att cag cgg ctg gcc tat gat gtg gcc ggg cag cta aaa ggg agt Asn Ile Gln Arg Leu Ala Tyr Asp Val Ala Gly Gln Leu Lys Gly Ser 245 250 255	768
tgg tta aca ctc aaa ggt cag gcg gaa cag gtg att atc aaa tcg cta Trp Leu Thr Leu Lys Gly Gln Ala Glu Gln Val Ile Ile Lys Ser Leu 260 265 270	816
acc tac tcc gcc gcc ggg caa aaa tta cgt gaa gag cac ggt aac ggg Thr Tyr Ser Ala Ala Gly Gln Lys Leu Arg Glu Glu His Gly Asn Gly 275 280 285	864
att gtc act gaa tac agc tac gaa ccg gaa acc caa cgg ctt atc ggc Ile Val Thr Glu Tyr Ser Tyr Glu Pro Glu Thr Gln Arg Leu Ile Gly 290 295 300	912
att acc act cgc cgt cca tca gac gcc aag gtg ttg caa gac cta cgc Ile Thr Thr Arg Arg Pro Ser Asp Ala Lys Val Leu Gln Asp Leu Arg 305 310 315 320	960
tat caa tat gac cca gta ggc aat gtc att agt atc cgt aat gat gcg Tyr Gln Tyr Asp Pro Val Gly Asn Val Ile Ser Ile Arg Asn Asp Ala 325 330 335	1008
gaa gcc act cgc ttt tgg cgc aat cag aaa gta gcc ccg gag aat agc Glu Ala Thr Arg Phe Trp Arg Asn Gln Lys Val Ala Pro Glu Asn Ser 340 345 350	1056
tat acc tac gat tcc ctg tat cag ctt atc agc gcc acc ggg cgc gag Tyr Thr Tyr Asp Ser Leu Tyr Gln Leu Ile Ser Ala Thr Gly Arg Glu 355 360 365	1104
atg gcc aat atc ggt cag caa agc aac caa ctt ccc tct ccg gcg cta Met Ala Asn Ile Gly Gln Gln Ser Asn Gln Leu Pro Ser Pro Ala Leu 370 375 380	1152
cct tct gat aac aat acc tac acc aac tat act cgc act tat act tat Pro Ser Asp Asn Asn Thr Tyr Thr Asn Tyr Thr Arg Thr Tyr Thr Tyr 385 390 395 400	1200
gac cgt ggc ggc aat ttg acg aaa att cag cat agt tca cca gcc gcg	1248

Asp	Arg	Gly	Gly	Asn	Leu	Thr	Lys	Ile	Gln	His	Ser	Ser	Pro	Ala	Ala			
				405					410					415				
caa	aat	aac	tac	acg	acg	gat	ata	acg	gtt	tca	aat	cgc	agc	aac	cgc			1296
Gln	Asn	Asn	Tyr	Thr	Thr	Asp	Ile	Thr	Val	Ser	Asn	Arg	Ser	Asn	Arg			
			420					425				430						
gcg	gta	ctc	agc	aca	ttg	acc	gca	gat	cca	act	caa	gtc	gat	gcc	tta			1344
Ala	Val	Leu	Ser	Thr	Leu	Thr	Ala	Asp	Pro	Thr	Gln	Val	Asp	Ala	Leu			
			435				440					445						
ttt	gat	gcg	gga	ggc	cat	caa	acc	agc	ttg	tta	tcc	ggc	caa	gtt	cta			1392
Phe	Asp	Ala	Gly	Gly	His	Gln	Thr	Ser	Leu	Leu	Ser	Gly	Gln	Val	Leu			
	450					455					460							
act	tgg	aca	ccg	cga	ggc	gaa	ttg	aaa	caa	gcc	aac	aat	agc	gca	gga			1440
Thr	Trp	Thr	Pro	Arg	Gly	Glu	Leu	Lys	Gln	Ala	Asn	Asn	Ser	Ala	Gly			
	465				470				475						480			
aat	gag	tgg	tat	cgc	tac	gat	agc	aac	ggc	ata	cgc	cag	cta	aaa	gtg			1488
Asn	Glu	Trp	Tyr	Arg	Tyr	Asp	Ser	Asn	Gly	Ile	Arg	Gln	Leu	Lys	Val			
				485					490				495					
aat	gaa	caa	caa	act	cag	aat	atc	ccg	caa	caa	caa	agg	gta	act	tat			1536
Asn	Glu	Gln	Gln	Thr	Gln	Asn	Ile	Pro	Gln	Gln	Gln	Arg	Val	Thr	Tyr			
			500					505					510					
cta	ccg	ggg	ctg	gaa	ata	cgt	aca	acc	cag	aac	aac	gcc	aca	aca	aca			1584
Leu	Pro	Gly	Leu	Glu	Ile	Arg	Thr	Thr	Gln	Asn	Asn	Ala	Thr	Thr	Thr			
		515					520					525						
gaa	gag	tta	cac	gtt	atc	aca	ctc	ggg	aaa	gcc	ggc	cgc	gcg	caa	gtc			1632
Glu	Glu	Leu	His	Val	Ile	Thr	Leu	Gly	Lys	Ala	Gly	Arg	Ala	Gln	Val			
		530				535					540							
cga	gta	ttg	cat	tgg	gag	agc	ggg	aaa	cca	gaa	gat	att	aat	aac	aat			1680
Arg	Val	Leu	His	Trp	Glu	Ser	Gly	Lys	Pro	Glu	Asp	Ile	Asn	Asn	Asn			
	545				550				555						560			
cag	ctt	cgt	tac	agc	tac	gat	aat	ctt	att	ggc	tcc	agc	caa	ctt	caa			1728
Gln	Leu	Arg	Tyr	Ser	Tyr	Asp	Asn	Leu	Ile	Gly	Ser	Ser	Gln	Leu	Gln			
				565					570					575				
tta	gat	agc	gac	gga	caa	att	atc	agt	gaa	gaa	gaa	tat	tat	cca	ttt			1776
Leu	Asp	Ser	Asp	Gly	Gln	Ile	Ile	Ser	Glu	Glu	Glu	Tyr	Tyr	Pro	Phe			
			580					585					590					
ggg	ggg	aca	gcg	ctg	tgg	gcg	gca	agg	aat	caa	acc	gaa	gcc	agc	tat			1824
Gly	Gly	Thr	Ala	Leu	Trp	Ala	Ala	Arg	Asn	Gln	Thr	Glu	Ala	Ser	Tyr			
		595				600						605						
aaa	acc	att	cgt	tat	tct	ggg	aaa	gag	cgg	gat	gtt	acc	ggg	ctg	tat			1872
Lys	Thr	Ile	Arg	Tyr	Ser	Gly	Lys	Glu	Arg	Asp	Val	Thr	Gly	Leu	Tyr			
	610					615					620							
tat	tat	ggc	tac	cgt	tat	tac	caa	ccg	tgg	gcg	ggc	aga	tgg	tta	ggg			1920
Tyr	Tyr	Gly	Tyr	Arg	Tyr	Tyr	Gln	Pro	Trp	Ala	Gly	Arg	Trp	Leu	Gly			

625	630	635	640	
gca gac ccg gca gga acc att gat gga ctg aat tta tat cgc atg gtg				1968
Ala Asp Pro Ala Gly Thr Ile Asp Gly Leu Asn Leu Tyr Arg Met Val				
	645	650	655	
aga aat aac ccg gtg acg caa ttt gat gtt cag gga tta tca ccg gcc				2016
Arg Asn Asn Pro Val Thr Gln Phe Asp Val Gln Gly Leu Ser Pro Ala				
	660	665	670	
aac aga aca gaa gaa gcg ata ata aaa cag ggt tcc ttt acg gga atg				2064
Asn Arg Thr Glu Glu Ala Ile Ile Lys Gln Gly Ser Phe Thr Gly Met				
	675	680	685	
gaa gaa gct gtt tat aaa aaa atg gct aaa cct caa act ttc aaa cgc				2112
Glu Glu Ala Val Tyr Lys Lys Met Ala Lys Pro Gln Thr Phe Lys Arg				
	690	695	700	
caa aga gct atc gct gcc caa aca gag caa gaa gcc cat gaa tca ttg				2160
Gln Arg Ala Ile Ala Ala Gln Thr Glu Gln Glu Ala His Glu Ser Leu				
	705	710	715	720
acc aac aac cct agt gta gat att agc cca att aaa aac tac acc aca				2208
Thr Asn Asn Pro Ser Val Asp Ile Ser Pro Ile Lys Asn Tyr Thr Thr				
	725	730	735	
gat agc tca caa att aat gcc gcg ata agg gaa aat cgt att acg cca				2256
Asp Ser Ser Gln Ile Asn Ala Ala Ile Arg Glu Asn Arg Ile Thr Pro				
	740	745	750	
gca gtg gaa agt tta gac gcc aca tta tct tcc cta caa gat aga caa				2304
Ala Val Glu Ser Leu Asp Ala Thr Leu Ser Ser Leu Gln Asp Arg Gln				
	755	760	765	
atg agg gta act tat cgg gtg atg acc tat gta gat aat tcc acg cca				2352
Met Arg Val Thr Tyr Arg Val Met Thr Tyr Val Asp Asn Ser Thr Pro				
	770	775	780	
tcg cct tgg cac tcg cca cag gaa gga aat agt att aat gtt ggt gat				2400
Ser Pro Trp His Ser Pro Gln Glu Gly Asn Ser Ile Asn Val Gly Asp				
	785	790	795	800
atc gtt tcg gat aac gct tat tta tca aca tcg gcc cat cgt ggt ttt				2448
Ile Val Ser Asp Asn Ala Tyr Leu Ser Thr Ser Ala His Arg Gly Phe				
	805	810	815	
ctg aat ttt gtt cac aaa aaa gaa acc agt gaa act cga tac gtc aag				2496
Leu Asn Phe Val His Lys Lys Glu Thr Ser Glu Thr Arg Tyr Val Lys				
	820	825	830	
atg gca ttt tta acg aat gcg ggt gtc aat gtc cca gca gca tct atg				2544
Met Ala Phe Leu Thr Asn Ala Gly Val Asn Val Pro Ala Ala Ser Met				
	835	840	845	
tat aat aat gct ggc gag gag caa gta ttt aaa atg gat tta aac gat				2592
Tyr Asn Asn Ala Gly Glu Glu Gln Val Phe Lys Met Asp Leu Asn Asp				
	850	855	860	

tca aga aaa agc ctt gct gaa aaa tta aaa cta aga gtc agt gga cca 2640
 Ser Arg Lys Ser Leu Ala Glu Lys Leu Lys Leu Arg Val Ser Gly Pro
 865 870 875 880

caa tcg gga caa gcg gaa ata tta cta cct agg gaa aca cag ttc gaa 2688
 Gln Ser Gly Gln Ala Glu Ile Leu Leu Pro Arg Glu Thr Gln Phe Glu
 885 890 895

gtt gtt tca atg aaa cat caa ggc aga gat acc tat gta tta ttg caa 2736
 Val Val Ser Met Lys His Gln Gly Arg Asp Thr Tyr Val Leu Leu Gln
 900 905 910

gat att aac caa tcc gca gcc act cat aga aat gta cgt aac act tac 2784
 Asp Ile Asn Gln Ser Ala Ala Thr His Arg Asn Val Arg Asn Thr Tyr
 915 920 925

acc ggt aat ttc aaa tca tcc agt gca aat taa 2817
 Thr Gly Asn Phe Lys Ser Ser Ser Ala Asn
 930 935

<210> 58
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 <213> Photorhabdus luminescens

<400> 58

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Val Leu Asp Asn Arg Lys Leu Asn Val Arg Thr Leu Glu Tyr Leu Arg
 20 25 30

Thr Gln Ala Asp Glu Asn Ser Asp Glu Leu Ile Thr Phe Tyr Glu Phe
 35 40 45

Asn Ile Pro Gly Phe Gln Val Lys Ser Thr Asp Pro Arg Lys Asn Lys
 50 55 60

Asn Gln Ser Gly Pro Asn Phe Ile Arg Val Phe Asn Leu Ala Gly Gln
 65 70 75 80

Val Leu Arg Glu Glu Ser Val Asp Ala Gly Arg Thr Ile Thr Leu Asn
 85 90 95

Asp Ile Glu Ser Arg Pro Val Leu Ile Ile Asn Ala Thr Gly Val Arg
 100 105 110

Gln Asn His Arg Tyr Glu Asp Asn Thr Leu Pro Gly Arg Leu Leu Ala
 115 120 125

Ile Thr Glu Gln Val Gln Ala Gly Glu Lys Thr Thr Glu Arg Leu Ile
 130 135 140

Trp Ala Gly Asn Thr Pro Gln Glu Lys Asp Tyr Asn Leu Ala Gly Gln
 145 150 155 160

Cys Val Arg His Tyr Asp Thr Ala Gly Leu Thr Gln Leu Asn Ser Leu
 165 170 175

Ser Leu Ala Gly Val Val Leu Ser Gln Ser Gln Gln Leu Leu Val Asp
 180 185 190

Asp Lys Asn Ala Asp Trp Thr Gly Glu Asp Gln Ser Leu Trp Gln Gln
 195 200 205

Lys Leu Ser Ser Asp Val Tyr Thr Thr Gln Asn Lys Ala Asp Ala Thr
 210 215 220

Gly Ala Leu Leu Thr Gln Thr Asp Ala Lys Gly Asn Ile Gln Arg Leu
 225 230 235 240

Ala Tyr Asp Val Ala Gly Gln Leu Lys Gly Cys Trp Leu Thr Leu Lys
 245 250 255

Gly Gln Ala Glu Gln Val Ile Ile Lys Ser Leu Thr Tyr Ser Ala Ala
 260 265 270

Gly Gln Lys Leu Arg Glu Glu His Gly Asn Gly Val Ile Thr Glu Tyr
 275 280 285

Ser Tyr Glu Pro Glu Thr Gln Arg Leu Ile Gly Ile Ala Thr Arg Arg
 290 295 300

Pro Ser Asp Ala Lys Val Leu Gln Asp Leu Arg Tyr Gln Tyr Asp Pro
 305 310 315 320

Val Gly Asn Val Ile Asn Ile Arg Asn Asp Ala Glu Ala Thr Arg Phe
 325 330 335

Trp Arg Asn Gln Lys Val Val Pro Glu Asn Ser Tyr Thr Tyr Asp Ser

340	345	350
Leu Tyr Gln Leu Ile Ser Ala Thr Gly Arg Glu Met Ala Asn Ile Gly		
355	360	365
Gln Gln Asn Asn Gln Leu Pro Ser Pro Ala Leu Pro Ser Asp Asn Asn		
370	375	380
Thr Tyr Thr Asn Tyr Thr Arg Ser Tyr Ser Tyr Asp His Ser Gly Asn		
385	390	395 400
Leu Thr Gln Ile Arg His Ser Ser Pro Ala Thr Gln Asn Asn Tyr Thr		
405	410	415
Val Ala Ile Thr Leu Ser Asn Arg Ser Asn Arg Gly Val Leu Ser Thr		
420	425	430
Leu Thr Thr Asp Pro Asn Gln Val Asp Thr Leu Phe Asp Ala Gly Gly		
435	440	445
His Gln Thr Ser Leu Leu Pro Gly Gln Thr Leu Ile Trp Thr Pro Arg		
450	455	460
Gly Glu Leu Lys Gln Val Asn Asn Gly Pro Gly Asn Glu Trp Tyr Arg		
465	470	475 480
Tyr Asp Ser Asn Gly Met Arg Gln Leu Lys Val Ser Glu Gln Pro Thr		
485	490	495
Gln Asn Thr Thr Gln Gln Gln Arg Val Ile Tyr Leu Pro Gly Leu Glu		
500	505	510
Leu Arg Thr Thr Gln Ser Asn Ala Thr Thr Thr Glu Glu Leu His Val		
515	520	525
Ile Thr Leu Gly Glu Ala Gly Arg Ala Gln Val Arg Val Leu His Trp		
530	535	540
Glu Ser Gly Lys Pro Glu Asp Val Asn Asn Asn Gln Leu Arg Tyr Ser		
545	550	555 560
Tyr Asp Asn Leu Ile Gly Ser Ser Gln Leu Glu Leu Asp Asn Gln Gly		
565	570	575

Gln Ile Ile Ser Glu Glu Glu Tyr Tyr Pro Phe Gly Gly Thr Ala Leu
580 585 590

Trp Ala Ala Asn Ser Gln Thr Glu Ala Ser Tyr Lys Thr Ile Arg Tyr
595 600 605

Ser Gly Lys Glu Arg Asp Ala Thr Gly Leu Tyr Tyr Tyr Gly Tyr Arg
610 615 620

Tyr Tyr Gln Pro Trp Ala Gly Arg Trp Leu Ser Ala Asp Pro Ala Gly
625 630 635 640

Thr Ile Asp Gly Leu Asn Leu Tyr Arg Met Val Arg Asn Asn Pro Val
645 650 655

Ser Leu Gln Asp Glu Asn Gly Leu Ala Pro Glu Lys Gly Lys Tyr Thr
660 665 670

Lys Glu Val Asn Phe Phe Asp Glu Leu Lys Phe Lys Leu Ala Ala Lys
675 680 685

Ser Ser His Val Val Lys Trp Asn Glu Lys Glu Ser Ser Tyr Thr Lys
690 695 700

Asn Lys Ser Leu Lys Val Val Arg Val Gly Asp Ser Asp Pro Ser Gly
705 710 715 720

Tyr Leu Leu Ser His Glu Glu Leu Leu Lys Gly Ile Glu Lys Ser Gln
725 730 735

Ile Ile Tyr Ser Arg Leu Glu Glu Asn Ser Ser Leu Ser Glu Lys Ser
740 745 750

Lys Thr Asn Leu Ser Leu Gly Ser Glu Ile Ser Gly Tyr Met Ala Arg
755 760 765

Thr Ile Gln Asp Thr Ile Ser Glu Tyr Ala Glu Glu His Lys Tyr Arg
770 775 780

Ser Asn His Pro Asp Phe Tyr Ser Glu Thr Asp Phe Phe Ala Leu Met
785 790 795 800

Asp Lys Ser Glu Lys Asn Asp Tyr Ser Gly Glu Arg Lys Ile Tyr Ala
 805 810 815

Ala Met Glu Val Lys Val Tyr His Asp Leu Lys Asn Lys Gln Ser Glu
 820 825 830

Leu His Val Asn Tyr Ala Leu Ala His Pro Tyr Thr Gln Leu Ser Asn
 835 840 845

Glu Glu Arg Ala Leu Leu Gln Glu Thr Glu Pro Ala Ile Ala Ile Asp
 850 855 860

Arg Glu Tyr Asn Phe Lys Gly Val Gly Lys Phe Leu Thr Met Lys Ala
 865 870 875 880

Ile Lys Lys Ser Leu Lys Gly His Lys Ile Asn Arg Ile Ser Thr Glu
 885 890 895

Ala Ile Asn Ile Arg Ser Ala Ala Ile Ala Glu Asn Leu Gly Met Arg
 900 905 910

Arg Thr Ser
 915

<210> 59
 <211> 2504
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 <213> Photorhabdus luminescens

<400> 59

Met Gln Asn Ser Leu Ser Ser Thr Ile Asp Thr Ile Cys Gln Lys Leu
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Gln Leu Thr Cys Pro Ala Glu Ile Ala Leu Tyr Pro Phe Asp Thr Phe
 20 25 30

Arg Glu Lys Thr Arg Gly Met Val Asn Trp Gly Glu Ala Lys Arg Ile
 35 40 45

Tyr Glu Ile Ala Gln Ala Glu Gln Asp Arg Asn Leu Leu His Glu Lys
 50 55 60

Arg Ile Phe Ala Tyr Ala Asn Pro Leu Leu Lys Asn Ala Val Arg Leu

65		70		75		80
Gly Thr Arg Gln Met Leu Gly Phe Ile Gln Gly Tyr Ser Asp Leu Phe						
		85		90		95
Gly Asn Arg Ala Asp Asn Tyr Ala Ala Pro Gly Ser Val Ala Ser Met						
		100		105		110
Phe Ser Pro Ala Ala Tyr Leu Thr Glu Leu Tyr Arg Glu Ala Lys Asn						
		115		120		125
Leu His Asp Ser Ser Ser Ile Tyr Tyr Leu Asp Lys Arg Arg Pro Asp						
		130		135		140
Leu Ala Ser Leu Met Leu Ser Gln Lys Asn Met Asp Glu Glu Ile Ser						
		145		150		155
Thr Leu Ala Leu Ser Asn Glu Leu Cys Leu Ala Gly Ile Glu Thr Lys						
		165		170		175
Thr Gly Lys Ser Gln Asp Glu Val Met Asp Met Leu Ser Thr Tyr Arg						
		180		185		190
Leu Ser Gly Glu Thr Pro Tyr His His Ala Tyr Glu Thr Val Arg Glu						
		195		200		205
Ile Val His Glu Arg Asp Pro Gly Phe Arg His Leu Ser Gln Ala Pro						
		210		215		220
Ile Val Ala Ala Lys Leu Asp Pro Val Thr Leu Leu Gly Ile Ser Ser						
		225		230		235
His Ile Ser Pro Glu Leu Tyr Asn Leu Leu Ile Glu Glu Ile Pro Glu						
		245		250		255
Lys Asp Glu Ala Ala Leu Asp Thr Leu Tyr Lys Thr Asn Phe Gly Asp						
		260		265		270
Ile Thr Thr Ala Gln Leu Met Ser Pro Ser Tyr Leu Ala Arg Tyr Tyr						
		275		280		285
Gly Val Ser Pro Glu Asp Ile Ala Tyr Val Thr Thr Ser Leu Ser His						
		290		295		300

Val Gly Tyr Ser Ser Asp Ile Leu Val Ile Pro Leu Val Asp Gly Val
305 310 315 320

Gly Lys Met Glu Val Val Arg Val Thr Arg Thr Pro Ser Asp Asn Tyr
325 330 335

Thr Ser Gln Thr Asn Tyr Ile Glu Leu Tyr Pro Gln Gly Gly Asp Asn
340 345 350

Tyr Leu Ile Lys Tyr Asn Leu Ser Asn Ser Phe Gly Leu Asp Asp Phe
355 360 365

Tyr Leu Gln Tyr Lys Asp Gly Ser Ala Asp Trp Thr Glu Ile Ala His
370 375 380

Asn Pro Tyr Pro Asp Met Val Ile Asn Gln Lys Tyr Glu Ser Gln Ala
385 390 395 400

Thr Ile Lys Arg Ser Asp Ser Asp Asn Ile Leu Ser Ile Gly Leu Gln
405 410 415

Arg Trp His Ser Gly Ser Tyr Asn Phe Ala Ala Ala Asn Phe Lys Ile
420 425 430

Asp Gln Tyr Ser Pro Lys Ala Phe Leu Leu Lys Met Asn Lys Ala Ile
435 440 445

Arg Leu Leu Lys Ala Thr Gly Leu Ser Phe Ala Thr Leu Glu Arg Ile
450 455 460

Val Asp Ser Val Asn Ser Thr Lys Ser Ile Thr Val Glu Val Leu Asn
465 470 475 480

Lys Val Tyr Arg Val Lys Phe Tyr Ile Asp Arg Tyr Gly Ile Ser Glu
485 490 495

Glu Thr Ala Ala Ile Leu Ala Asn Ile Asn Ile Ser Gln Gln Ala Val
500 505 510

Gly Asn Gln Leu Ser Gln Phe Glu Gln Leu Phe Asn His Pro Pro Leu
515 520 525

Asn Gly Ile Arg Tyr Glu Ile Ser Glu Asp Asn Ser Lys His Leu Pro
 530 535 540

Asn Pro Asp Leu Asn Leu Lys Pro Asp Ser Thr Gly Asp Asp Gln Arg
 545 550 555 560

Lys Ala Val Leu Lys Arg Ala Phe Gln Val Asn Ala Ser Glu Leu Tyr
 565 570 575

Gln Met Leu Leu Ile Thr Asp Arg Lys Glu Asp Gly Val Ile Lys Asn
 580 585 590

Asn Leu Glu Asn Leu Ser Asp Leu Tyr Leu Val Ser Leu Leu Ala Gln
 595 600 605

Ile His Asn Leu Thr Ile Ala Glu Leu Asn Ile Leu Leu Val Ile Cys
 610 615 620

Gly Tyr Gly Asp Thr Asn Ile Tyr Gln Ile Thr Asp Asp Asn Leu Ala
 625 630 635 640

Lys Ile Val Glu Thr Leu Leu Trp Ile Thr Gln Trp Leu Lys Thr Gln
 645 650 655

Lys Trp Thr Val Thr Asp Leu Phe Leu Met Thr Thr Ala Thr Tyr Ser
 660 665 670

Thr Thr Leu Thr Pro Glu Ile Ser Asn Leu Thr Ala Thr Leu Ser Ser
 675 680 685

Thr Leu His Gly Lys Glu Ser Leu Ile Gly Glu Asp Leu Lys Arg Ala
 690 695 700

Met Ala Pro Cys Phe Thr Ser Ala Leu His Leu Thr Ser Gln Glu Val
 705 710 715 720

Ala Tyr Asp Leu Leu Leu Trp Ile Asp Gln Ile Gln Pro Ala Gln Ile
 725 730 735

Thr Val Asp Gly Phe Trp Glu Glu Val Gln Thr Thr Pro Thr Ser Leu
 740 745 750

Lys Val Ile Thr Phe Ala Gln Val Leu Ala Gln Leu Ser Leu Ile Tyr
 755 760 765

Arg Arg Ile Gly Leu Ser Glu Thr Glu Leu Ser Leu Ile Val Thr Gln
 770 775 780

Ser Ser Leu Leu Val Ala Gly Lys Ser Ile Leu Asp His Gly Leu Leu
 785 790 795 800

Thr Leu Met Ala Leu Glu Gly Phe His Thr Trp Val Asn Gly Leu Gly
 805 810 815

Gln His Ala Ser Leu Ile Leu Ala Ala Leu Lys Asp Gly Ala Leu Thr
 820 825 830

Val Thr Asp Val Ala Gln Ala Met Asn Lys Glu Glu Ser Leu Leu Gln
 835 840 845

Met Ala Ala Asn Gln Val Glu Lys Asp Leu Thr Lys Leu Thr Ser Trp
 850 855 860

Thr Gln Ile Asp Ala Ile Leu Gln Trp Leu Gln Met Ser Ser Ala Leu
 865 870 875 880

Ala Val Ser Pro Leu Asp Leu Ala Gly Met Met Ala Leu Lys Tyr Gly
 885 890 895

Ile Asp His Asn Tyr Ala Ala Trp Gln Ala Ala Ala Ala Ala Leu Met
 900 905 910

Ala Asp His Ala Asn Gln Ala Gln Lys Lys Leu Asp Glu Thr Phe Ser
 915 920 925

Lys Ala Leu Cys Asn Tyr Tyr Ile Asn Ala Val Val Asp Ser Ala Ala
 930 935 940

Gly Val Arg Asp Arg Asn Gly Leu Tyr Thr Tyr Leu Leu Ile Asp Asn
 945 950 955 960

Gln Val Ser Ala Asp Val Ile Thr Ser Arg Ile Ala Glu Ala Ile Ala
 965 970 975

Gly Ile Gln Leu Tyr Val Asn Arg Ala Leu Asn Arg Asp Glu Gly Gln

980

985

990

Leu Ala Ser Asp Val Ser Thr Arg Gln Phe Phe Thr Asp Trp Glu Arg
 995 1000 1005

Tyr Asn Lys Arg Tyr Ser Thr Trp Ala Gly Val Ser Glu Leu Val
 1010 1015 1020

Tyr Tyr Pro Glu Asn Tyr Val Asp Pro Thr Gln Arg Ile Gly Gln
 1025 1030 1035

Thr Lys Met Met Asp Ala Leu Leu Gln Ser Ile Asn Gln Ser Gln
 1040 1045 1050

Leu Asn Ala Asp Thr Val Glu Asp Ala Phe Lys Thr Tyr Leu Thr
 1055 1060 1065

Ser Phe Glu Gln Val Ala Asn Leu Lys Val Ile Ser Ala Tyr His
 1070 1075 1080

Asp Asn Val Asn Val Asp Gln Gly Leu Thr Tyr Phe Ile Gly Ile
 1085 1090 1095

Asp Gln Ala Ala Pro Gly Thr Tyr Tyr Trp Arg Ser Val Asp His
 1100 1105 1110

Ser Lys Cys Glu Asn Gly Lys Phe Ala Ala Asn Ala Trp Gly Glu
 1115 1120 1125

Trp Asn Lys Ile Thr Cys Ala Val Asn Pro Trp Lys Asn Ile Ile
 1130 1135 1140

Arg Pro Val Val Tyr Met Ser Arg Leu Tyr Leu Leu Trp Leu Glu
 1145 1150 1155

Gln Gln Ser Lys Lys Ser Asp Asp Gly Lys Thr Thr Ile Tyr Gln
 1160 1165 1170

Tyr Asn Leu Lys Leu Ala His Ile Arg Tyr Asp Gly Ser Trp Asn
 1175 1180 1185

Thr Pro Phe Thr Phe Asp Val Thr Glu Lys Val Lys Asn Tyr Thr
 1190 1195 1200

Ser	Ser	Thr	Asp	Ala	Ala	Glu	Ser	Leu	Gly	Leu	Tyr	Cys	Thr	Gly
1205						1210					1215			
Tyr	Gln	Gly	Glu	Asp	Thr	Leu	Leu	Val	Met	Phe	Tyr	Ser	Met	Gln
1220						1225					1230			
Ser	Ser	Tyr	Ser	Ser	Tyr	Thr	Asp	Asn	Asn	Ala	Pro	Val	Thr	Gly
1235						1240					1245			
Leu	Tyr	Ile	Phe	Ala	Asp	Met	Ser	Ser	Asp	Asn	Met	Thr	Asn	Ala
1250						1255					1260			
Gln	Ala	Thr	Asn	Tyr	Trp	Asn	Asn	Ser	Tyr	Pro	Gln	Phe	Asp	Thr
1265						1270					1275			
Val	Met	Ala	Asp	Pro	Asp	Ser	Asp	Asn	Lys	Lys	Val	Ile	Thr	Arg
1280						1285					1290			
Arg	Val	Asn	Asn	Arg	Tyr	Ala	Glu	Asp	Tyr	Glu	Ile	Pro	Ser	Ser
1295						1300					1305			
Val	Thr	Ser	Asn	Ser	Asn	Tyr	Ser	Trp	Gly	Asp	His	Ser	Leu	Thr
1310						1315					1320			
Met	Leu	Tyr	Gly	Gly	Ser	Val	Pro	Asn	Ile	Thr	Phe	Glu	Ser	Ala
1325						1330					1335			
Ala	Glu	Asp	Leu	Arg	Leu	Ser	Thr	Asn	Met	Ala	Leu	Ser	Ile	Ile
1340						1345					1350			
His	Asn	Gly	Tyr	Ala	Gly	Thr	Arg	Arg	Ile	Gln	Cys	Asn	Leu	Met
1355						1360					1365			
Lys	Gln	Tyr	Ala	Ser	Leu	Gly	Asp	Lys	Phe	Ile	Ile	Tyr	Asp	Ser
1370						1375					1380			
Ser	Phe	Asp	Asp	Ala	Asn	Arg	Phe	Asn	Leu	Val	Pro	Leu	Phe	Lys
1385						1390					1395			
Phe	Gly	Lys	Asp	Glu	Asn	Ser	Asp	Asp	Ser	Ile	Cys	Ile	Tyr	Asn
1400						1405					1410			

Glu	Asn	Pro	Ser	Ser	Glu	Asp	Lys	Lys	Trp	Tyr	Phe	Ser	Ser	Lys
1415						1420					1425			
Asp	Asp	Asn	Lys	Thr	Ala	Asp	Tyr	Asn	Gly	Gly	Thr	Gln	Cys	Ile
1430						1435					1440			
Asp	Ala	Gly	Thr	Ser	Asn	Lys	Asp	Phe	Tyr	Tyr	Asn	Leu	Gln	Glu
1445						1450					1455			
Ile	Glu	Val	Ile	Ser	Val	Thr	Gly	Gly	Tyr	Trp	Ser	Ser	Tyr	Lys
1460						1465					1470			
Ile	Ser	Asn	Pro	Ile	Asn	Ile	Asn	Thr	Gly	Ile	Asp	Ser	Ala	Lys
1475						1480					1485			
Val	Lys	Val	Thr	Val	Lys	Ala	Gly	Gly	Asp	Asp	Gln	Ile	Phe	Thr
1490						1495					1500			
Ala	Asp	Asn	Ser	Thr	Tyr	Val	Pro	Gln	Gln	Pro	Ala	Pro	Ser	Phe
1505						1510					1515			
Glu	Glu	Met	Ile	Tyr	Gln	Phe	Asn	Asn	Leu	Thr	Ile	Asp	Cys	Lys
1520						1525					1530			
Asn	Leu	Asn	Phe	Ile	Asp	Asn	Gln	Ala	His	Ile	Glu	Ile	Asp	Phe
1535						1540					1545			
Thr	Ala	Thr	Ala	Gln	Asp	Gly	Arg	Phe	Leu	Gly	Ala	Glu	Thr	Phe
1550						1555					1560			
Ile	Ile	Pro	Val	Thr	Lys	Lys	Val	Leu	Gly	Thr	Glu	Asn	Val	Ile
1565						1570					1575			
Ala	Leu	Tyr	Ser	Glu	Asn	Asn	Gly	Val	Gln	Tyr	Met	Gln	Ile	Gly
1580						1585					1590			
Ala	Tyr	Arg	Thr	Arg	Leu	Asn	Thr	Leu	Phe	Ala	Gln	Gln	Leu	Val
1595						1600					1605			
Ser	Arg	Ala	Asn	Arg	Gly	Ile	Asp	Ala	Val	Leu	Ser	Met	Glu	Thr
1610						1615					1620			

Gln Asn	Ile Gln Glu Pro Gln	Leu Gly Ala Gly Thr	Tyr Val Gln
1625	1630	1635	
Leu Val	Leu Asp Lys Tyr Asp	Glu Ser Ile His Gly	Thr Asn Lys
1640	1645	1650	
Ser Phe	Ala Ile Glu Tyr Val	Asp Ile Phe Lys Glu	Asn Asp Ser
1655	1660	1665	
Phe Val	Ile Tyr Gln Gly Glu	Leu Ser Glu Thr Ser	Gln Thr Val
1670	1675	1680	
Val Lys	Val Phe Leu Ser Tyr	Phe Ile Glu Ala Thr	Gly Asn Lys
1685	1690	1695	
Asn His	Leu Trp Val Arg Ala	Lys Tyr Gln Lys Glu	Thr Thr Asp
1700	1705	1710	
Lys Ile	Leu Phe Asp Arg Thr	Asp Glu Lys Asp Pro	His Gly Trp
1715	1720	1725	
Phe Leu	Ser Asp Asp His Lys	Thr Phe Ser Gly Leu	Ser Ser Ala
1730	1735	1740	
Gln Ala	Leu Lys Asn Asp Ser	Glu Pro Met Asp Phe	Ser Gly Ala
1745	1750	1755	
Asn Ala	Leu Tyr Phe Trp Glu	Leu Phe Tyr Tyr Thr	Pro Met Met
1760	1765	1770	
Met Ala	His Arg Leu Leu Gln	Glu Gln Asn Phe Asp	Ala Ala Asn
1775	1780	1785	
His Trp	Phe Arg Tyr Val Trp	Ser Pro Ser Gly Tyr	Ile Val Asp
1790	1795	1800	
Gly Lys	Ile Ala Ile Tyr His	Trp Asn Val Arg Pro	Leu Glu Glu
1805	1810	1815	
Asp Thr	Ser Trp Asn Ala Gln	Gln Leu Asp Ser Thr	Asp Pro Asp
1820	1825	1830	
Ala Val	Ala Gln Asp Asp Pro	Met His Tyr Lys Val	Ala Thr Phe

1835		1840		1845
Met Ala Thr Leu Asp Leu	Leu	Met Ala Arg Gly Asp	Ala Ala Tyr	
1850		1855		1860
Arg Gln Leu Glu Arg Asp	Thr	Leu Ala Glu Ala Lys	Met Trp Tyr	
1865		1870		1875
Thr Gln Ala Leu Asn Leu	Leu	Gly Asp Glu Pro Gln	Val Met Leu	
1880		1885		1890
Ser Thr Thr Trp Ala Asn	Pro	Thr Leu Gly Asn Ala	Ala Ser Lys	
1895		1900		1905
Thr Thr Gln Gln Val Arg	Gln	Gln Val Leu Thr Gln	Leu Arg Leu	
1910		1915		1920
Asn Ser Arg Val Lys Thr	Pro	Leu Leu Gly Thr Ala	Asn Ser Leu	
1925		1930		1935
Thr Ala Leu Phe Leu Pro	Gln	Glu Asn Ser Lys Leu	Lys Gly Tyr	
1940		1945		1950
Trp Arg Thr Leu Ala Gln	Arg	Met Phe Asn Leu Arg	His Asn Leu	
1955		1960		1965
Ser Ile Asp Gly Gln Pro	Leu	Ser Leu Pro Leu Tyr	Ala Lys Pro	
1970		1975		1980
Ala Asp Pro Lys Ala Leu	Leu	Ser Ala Ala Val Ser	Ala Ser Gln	
1985		1990		1995
Gly Gly Ala Asp Leu Pro	Lys	Ala Pro Leu Thr Ile	His Arg Phe	
2000		2005		2010
Pro Gln Met Leu Glu Gly	Ala	Arg Gly Leu Val Asn	Gln Leu Ile	
2015		2020		2025
Gln Phe Gly Ser Ser Leu	Leu	Gly Tyr Ser Glu Arg	Gln Asp Ala	
2030		2035		2040
Glu Ala Met Ser Gln Leu	Leu	Gln Thr Gln Ala Ser	Glu Leu Ile	
2045		2050		2055

Leu Thr	Ser Ile Arg Met	Gln Asp Asn Gln Leu	Ala Glu Leu Asp
2060		2065	2070
Ser Glu	Lys Thr Ala Leu	Gln Val Ser Leu Ala	Gly Val Gln Gln
2075		2080	2085
Arg Phe	Asp Ser Tyr Ser	Gln Leu Tyr Glu Glu	Asn Ile Asn Ala
2090		2095	2100
Gly Glu	Gln Arg Ala Leu	Ala Leu Arg Ser Glu	Ser Ala Ile Glu
2105		2110	2115
Ser Gln	Gly Ala Gln Ile	Ser Arg Met Ala Gly	Ala Gly Val Asp
2120		2125	2130
Met Ala	Pro Asn Ile Phe	Gly Leu Ala Asp Gly	Gly Met His Tyr
2135		2140	2145
Gly Ala	Ile Ala Tyr Ala	Ile Ala Asp Gly Ile	Glu Leu Ser Ala
2150		2155	2160
Ser Ala	Lys Met Val Asp	Ala Glu Lys Val Ala	Gln Ser Glu Ile
2165		2170	2175
Tyr Arg	Arg Arg Arg Gln	Glu Trp Lys Ile Gln	Arg Asp Asn Ala
2180		2185	2190
Gln Ala	Glu Ile Asn Gln	Leu Asn Ala Gln Leu	Glu Ser Leu Ser
2195		2200	2205
Ile Arg	Arg Glu Ala Ala	Glu Met Gln Lys Glu	Tyr Leu Lys Thr
2210		2215	2220
Gln Gln	Ala Gln Ala Gln	Ala Gln Leu Thr Phe	Leu Arg Ser Lys
2225		2230	2235
Phe Ser	Asn Gln Ala Leu	Tyr Ser Trp Leu Arg	Gly Arg Leu Ser
2240		2245	2250
Gly Ile	Tyr Phe Gln Phe	Tyr Asp Leu Ala Val	Ser Arg Cys Leu
2255		2260	2265

Met	Ala	Glu	Gln	Ser	Tyr	Gln	Trp	Glu	Ala	Asn	Asp	Asn	Ser	Ile
2270						2275					2280			
Ser	Phe	Val	Lys	Pro	Gly	Ala	Trp	Gln	Gly	Thr	Tyr	Ala	Gly	Leu
2285						2290					2295			
Leu	Cys	Gly	Glu	Ala	Leu	Ile	Gln	Asn	Leu	Ala	Gln	Met	Glu	Glu
2300						2305					2310			
Ala	Tyr	Leu	Lys	Trp	Glu	Ser	Arg	Ala	Leu	Glu	Val	Glu	Arg	Thr
2315						2320					2325			
Val	Ser	Leu	Ala	Val	Val	Tyr	Asp	Ser	Leu	Glu	Gly	Asn	Asp	Arg
2330						2335					2340			
Phe	Asn	Leu	Ala	Glu	Gln	Ile	Pro	Ala	Leu	Leu	Asp	Lys	Gly	Glu
2345						2350					2355			
Gly	Thr	Ala	Gly	Thr	Lys	Glu	Asn	Gly	Leu	Ser	Leu	Ala	Asn	Ala
2360						2365					2370			
Ile	Leu	Ser	Ala	Ser	Val	Lys	Leu	Ser	Asp	Leu	Lys	Leu	Gly	Thr
2375						2380					2385			
Asp	Tyr	Pro	Asp	Ser	Ile	Val	Gly	Ser	Asn	Lys	Val	Arg	Arg	Ile
2390						2395					2400			
Lys	Gln	Ile	Ser	Val	Ser	Leu	Pro	Ala	Leu	Val	Gly	Pro	Tyr	Gln
2405						2410					2415			
Asp	Val	Gln	Ala	Met	Leu	Ser	Tyr	Gly	Gly	Ser	Thr	Gln	Leu	Pro
2420						2425					2430			
Lys	Gly	Cys	Ser	Ala	Leu	Ala	Val	Ser	His	Gly	Thr	Asn	Asp	Ser
2435						2440					2445			
Gly	Gln	Phe	Gln	Leu	Asp	Phe	Asn	Asp	Gly	Lys	Tyr	Leu	Pro	Phe
2450						2455					2460			
Glu	Gly	Ile	Ala	Leu	Asp	Asp	Gln	Gly	Thr	Leu	Asn	Leu	Gln	Phe
2465						2470					2475			

Pro Asn Ala Thr Asp Lys Gln Lys Ala Ile Leu Gln Thr Met Ser
 2480 2485 2490

Asp Ile Ile Leu His Ile Arg Tyr Thr Ile Arg
 2495 2500

<210> 60
 <211> 1428
 <212> PRT
 <213> Serratia entomophila

<400> 60

Met Gln Asn His Gln Asp Met Ala Ile Thr Ala Pro Thr Leu Pro Ser
 1 5 10 15

Gly Gly Gly Ala Val Thr Gly Leu Lys Gly Asp Ile Ala Ala Ala Gly
 20 25 30

Pro Asp Gly Ala Ala Thr Leu Ser Ile Pro Leu Pro Val Ser Pro Gly
 35 40 45

Arg Gly Tyr Ala Pro Thr Gly Ala Leu Asn Tyr His Ser Arg Ser Gly
 50 55 60

Asn Gly Pro Phe Gly Ile Gly Trp Gly Ile Gly Gly Ala Ala Val Gln
 65 70 75 80

Arg Arg Thr Arg Asn Gly Ala Pro Thr Tyr Asp Asp Thr Asp Glu Phe
 85 90 95

Thr Gly Pro Asp Gly Glu Val Leu Val Pro Ala Leu Thr Ala Ala Gly
 100 105 110

Thr Gln Glu Ala Arg Gln Ala Thr Ser Leu Leu Gly Ile Asn Pro Gly
 115 120 125

Gly Ser Phe Asn Val Gln Val Tyr Arg Ser Arg Thr Glu Gly Ser Leu
 130 135 140

Ser Arg Leu Glu Arg Trp Leu Pro Ala Asp Glu Thr Glu Thr Glu Phe
 145 150 155 160

Trp Val Leu Tyr Thr Pro Asp Gly Gln Val Ala Leu Leu Gly Arg Asn
 165 170 175

Ala Gln Ala Arg Ile Ser Asn Pro Thr Ala Pro Thr Gln Thr Ala Val
180 185 190

Trp Leu Met Glu Ser Ser Val Ser Leu Thr Gly Glu Gln Met Tyr Tyr
195 200 205

Gln Tyr Arg Ala Glu Asp Asp Asp Gly Cys Asp Glu Ala Glu Arg Asp
210 215 220

Ala His Pro Gln Ala Gly Ala Gln Arg Tyr Pro Val Ala Val Trp Tyr
225 230 235 240

Gly Asn Arg Gln Ala Ala Arg Thr Leu Pro Ala Leu Val Ser Thr Pro
245 250 255

Ser Met Asp Ser Trp Leu Phe Ile Leu Val Phe Asp Tyr Gly Glu Arg
260 265 270

Ser Ser Val Leu Ser Glu Ala Pro Ala Trp Gln Thr Pro Gly Ser Gly
275 280 285

Glu Trp Leu Cys Arg Gln Asp Cys Phe Ser Gly Tyr Glu Phe Gly Phe
290 295 300

Asn Leu Arg Thr Arg Arg Leu Cys Arg Gln Val Leu Met Phe His Tyr
305 310 315 320

Leu Gly Val Leu Ala Gly Ser Ser Gly Ala Asn Asp Ala Pro Ala Leu
325 330 335

Ile Ser Arg Leu Leu Leu Asp Tyr Arg Glu Ser Pro Ser Leu Ser Leu
340 345 350

Leu Glu Asn Val His Gln Val Ala Tyr Glu Ser Asp Gly Thr Ser Cys
355 360 365

Ala Leu Pro Ala Leu Ala Leu Gly Trp Gln Thr Phe Thr Pro Pro Thr
370 375 380

Leu Ser Ala Trp Gln Thr Arg Asp Asp Met Gly Lys Leu Ser Leu Leu
385 390 395 400

Gln Pro Tyr Gln Leu Val Asp Leu Asn Gly Glu Gly Val Val Gly Ile
 405 410 415

Leu Tyr Gln Asp Ser Gly Ala Trp Trp Tyr Arg Glu Pro Val Arg Gln
 420 425 430

Ser Gly Asp Asp Pro Asp Ala Val Thr Trp Gly Ala Ala Ala Ala Leu
 435 440 445

Pro Thr Met Pro Ala Leu His Asn Ser Gly Ile Leu Ala Asp Leu Asn
 450 455 460

Gly Asp Gly Arg Leu Glu Trp Val Val Thr Ala Pro Gly Val Ala Gly
 465 470 475 480

Met Tyr Asp Arg Thr Pro Gly Arg Asp Trp Leu His Phe Thr Pro Leu
 485 490 495

Ser Ala Leu Pro Val Glu Tyr Ala His Pro Lys Ala Val Leu Ala Asp
 500 505 510

Ile Leu Gly Ala Gly Leu Thr Asp Met Val Leu Ile Gly Pro Arg Ser
 515 520 525

Val Arg Leu Tyr Ser Gly Lys Asn Asp Gly Trp Asn Lys Gly Glu Thr
 530 535 540

Val Gln Gln Thr Glu Arg Leu Thr Leu Pro Val Pro Gly Val Asp Pro
 545 550 555 560

Arg Thr Leu Val Ala Phe Ser Asp Met Ala Gly Ser Gly Gln Gln His
 565 570 575

Leu Thr Glu Val Arg Ala Asn Gly Val Arg Tyr Trp Pro Asn Leu Gly
 580 585 590

His Gly Arg Phe Gly Gln Pro Val Asn Ile Pro Gly Phe Ser Gln Ser
 595 600 605

Val Thr Thr Phe Asn Pro Asp Gln Ile Leu Leu Ala Asp Thr Asp Gly
 610 615 620

Ser Gly Thr Thr Asp Leu Ile Tyr Ala Met Ser Asp Arg Leu Val Ile
625 630 635 640

Tyr Phe Asn Gln Ser Gly Asn Tyr Phe Ala Glu Pro His Thr Leu Leu
645 650 655

Leu Pro Lys Gly Val Arg Tyr Asp Arg Thr Cys Ser Leu Gln Val Ala
660 665 670

Asp Ile Gln Gly Leu Gly Val Pro Ser Leu Leu Leu Thr Val Pro His
675 680 685

Val Ala Pro His His Trp Val Cys His Leu Ser Ala Asp Lys Pro Trp
690 695 700

Leu Leu Asn Gly Met Asn Asn Asn Met Gly Ala Arg His Ala Leu His
705 710 715 720

Tyr Arg Ser Ser Val Gln Phe Trp Leu Asp Glu Lys Ala Glu Ala Leu
725 730 735

Ala Ala Gly Ser Ser Pro Ala Cys Tyr Leu Pro Phe Thr Leu His Thr
740 745 750

Leu Trp Arg Ser Val Val Gln Asp Glu Ile Thr Gly Asn Arg Leu Val
755 760 765

Ser Asp Val Leu Tyr Arg His Gly Val Trp Asp Gly Gln Glu Arg Glu
770 775 780

Phe Arg Gly Phe Gly Phe Val Glu Ile Arg Asp Thr Asp Thr Leu Ala
785 790 795 800

Ser Gln Gly Thr Ala Thr Glu Leu Ser Met Pro Ser Val Ser Arg Asn
805 810 815

Trp Tyr Ala Thr Gly Val Pro Ala Val Asp Glu Arg Leu Pro Glu Thr
820 825 830

Tyr Trp Gln Asn Asp Ala Ala Ala Phe Ala Asp Phe Ala Thr Arg Phe
835 840 845

Thr Val Gly Ser Gly Glu Asp Glu Gln Thr Tyr Thr Pro Asp Asp Ser

850		855		860	
Lys Thr Phe Trp Leu Gln Arg Ala Leu Lys Gly Ile Leu Leu Arg Ser					
865		870		875	880
Glu Leu Tyr Gly Ala Asp Gly Ser Ser Gln Ala Asp Ile Pro Tyr Ser					
	885		890		895
Val Thr Glu Ser Arg Pro Gln Val Arg Leu Val Glu Ala Asn Gly Asp					
	900		905		910
Tyr Pro Val Val Trp Pro Met Gly Ala Glu Ser Arg Thr Ser Val Tyr					
	915		920		925
Glu Arg Tyr His Asn Asp Pro Gln Cys Gln Gln Gln Ala Val Leu Leu					
	930		935		940
Ser Asp Glu Tyr Gly Phe Pro Leu Arg Gln Val Ser Val Asn Tyr Pro					
	945		950		955
Arg Arg Pro Pro Ser Ala Asp Asn Pro Tyr Pro Ala Ser Leu Pro Ala					
		965		970	975
Thr Leu Phe Ala Asn Ser Tyr Asp Glu Gln Gln Gln Ile Leu Arg Leu					
	980		985		990
Gly Leu Gln Gln Ser Ser Ala His His Leu Val Ser Leu Ser Glu Gly					
	995		1000		1005
His Trp Leu Leu Gly Leu Ala Glu Ala Ser Arg Asp Asp Val Phe					
	1010		1015		1020
Thr Tyr Ser Ala Asp Asn Val Pro Glu Gly Gly Leu Thr Leu Glu					
	1025		1030		1035
His Leu Leu Ala Pro Glu Ser Leu Val Ser Asp Ser Gln Val Gly					
	1040		1045		1050
Thr Leu Ala Gly Gln Gln Gln Val Trp Tyr Leu Asp Ser Gln Asp					
	1055		1060		1065
Val Ala Thr Val Ala Ala Pro Pro Leu Pro Pro Lys Val Ala Phe					
	1070		1075		1080

Ile	Glu	Thr	Ala	Val	Leu	Asp	Glu	Gly	Met	Val	Ser	Ser	Leu	Ala
1085						1090					1095			
Ala	Tyr	Ile	Val	Asp	Glu	His	Leu	Glu	Gln	Ala	Gly	Tyr	Arg	Gln
1100						1105					1110			
Ser	Gly	Tyr	Leu	Phe	Pro	Arg	Gly	Arg	Glu	Ala	Glu	Gln	Ala	Leu
1115						1120					1125			
Trp	Thr	Gln	Cys	Gln	Gly	Tyr	Val	Thr	Tyr	Ala	Gly	Ala	Glu	His
1130						1135					1140			
Phe	Trp	Leu	Pro	Leu	Ser	Phe	Arg	Asp	Ser	Met	Leu	Thr	Gly	Pro
1145						1150					1155			
Val	Thr	Val	Thr	Arg	Asp	Ala	Tyr	Asp	Cys	Val	Ile	Thr	Gln	Trp
1160						1165					1170			
Gln	Asp	Ala	Ala	Gly	Ile	Val	Thr	Thr	Ala	Asp	Tyr	Asp	Trp	Arg
1175						1180					1185			
Phe	Leu	Thr	Pro	Val	Arg	Val	Thr	Asp	Pro	Asn	Asp	Asn	Leu	Gln
1190						1195					1200			
Ser	Val	Thr	Leu	Asp	Ala	Leu	Gly	Arg	Val	Thr	Thr	Leu	Arg	Phe
1205						1210					1215			
Trp	Gly	Thr	Glu	Asn	Gly	Ile	Ala	Thr	Gly	Tyr	Ser	Asp	Ala	Thr
1220						1225					1230			
Leu	Ser	Val	Pro	Asp	Gly	Ala	Ala	Ala	Ala	Leu	Ala	Leu	Thr	Ala
1235						1240					1245			
Pro	Leu	Pro	Val	Ala	Gln	Cys	Leu	Val	Tyr	Val	Thr	Asp	Ser	Trp
1250						1255					1260			
Gly	Asp	Asp	Asp	Asn	Glu	Lys	Met	Pro	Pro	His	Val	Val	Val	Leu
1265						1270					1275			
Ala	Thr	Asp	Arg	Tyr	Asp	Ser	Asp	Thr	Gly	Gln	Gln	Val	Arg	Gln
1280						1285					1290			

Gln Val Thr Phe Ser Asp Gly Phe Gly Arg Glu Leu Gln Ser Ala
1295 1300 1305

Thr Arg Gln Ala Glu Gly Asn Ala Trp Gln Arg Gly Arg Asp Gly
1310 1315 1320

Lys Leu Val Thr Ala Ser Asp Gly Leu Pro Val Thr Val Ala Thr
1325 1330 1335

Asn Phe Arg Trp Ala Val Thr Gly Arg Ala Glu Tyr Asp Asn Lys
1340 1345 1350

Gly Leu Pro Val Arg Val Tyr Gln Pro Tyr Phe Leu Asp Ser Trp
1355 1360 1365

Gln Tyr Val Ser Asp Asp Ser Ala Arg Gln Asp Leu Tyr Ala Asp
1370 1375 1380

Thr His Phe Tyr Asp Pro Thr Ala Arg Glu Trp Gln Val Ile Thr
1385 1390 1395

Ala Lys Gly Glu Arg Arg Gln Val Leu Tyr Thr Pro Trp Phe Val
1400 1405 1410

Val Ser Glu Asp Glu Asn Asp Thr Val Gly Leu Asn Asp Ala Ser
1415 1420 1425

<210> 61
<211> 973
<212> PRT
<213> Serratia entomophila

<400> 61

Met Ser Thr Ser Leu Phe Ser Ser Thr Pro Ser Val Ala Val Leu Asp
1 5 10 15

Asn Arg Gly Leu Leu Val Arg Glu Leu Gln Tyr Tyr Arg His Pro Asp
20 25 30

Thr Pro Glu Glu Thr Asp Glu Arg Ile Thr Cys His Gln His Asp Glu
35 40 45

Arg Gly Ser Leu Ser Gln Ser Ala Asp Pro Arg Leu His Ala Ala Gly

50		55		60	
Leu Thr Asn Phe Thr Tyr Leu Asn Ser Leu Thr Gly Thr Val Leu Gln					
65		70		75	80
Ser Val Ser Ala Asp Ala Gly Thr Ser Leu Glu Leu Ser Asp Ala Ala					
	85		90		95
Gly Arg Ala Phe Leu Ala Val Thr Gly Ala Gly Thr Glu Asp Ala Val					
	100		105		110
Thr Arg Thr Trp Gln Tyr Glu Asp Asp Thr Leu Pro Gly Arg Pro Leu					
	115		120		125
Ser Ile Thr Glu Gln Val Thr Gly Glu Ala Ala Gln Ile Thr Glu Arg					
	130		135		140
Phe Val Tyr Ala Gly Asn Thr Asp Ala Glu Lys Ile Leu Asn Leu Ala					
145		150		155	160
Gly Gln Cys Val Ser His Tyr Asp Thr Ala Gly Leu Val Gln Thr Asp					
	165		170		175
Ser Ile Ala Leu Ser Gly Val Pro Leu Ala Val Thr Arg Gln Leu Leu					
	180		185		190
Pro Asp Ala Ala Gly Ala Asn Trp Met Gly Glu Asp Ala Ser Ala Trp					
	195		200		205
Asn Asp Leu Leu Asp Gly Glu Thr Phe Phe Thr Gln Thr His Ala Asp					
	210		215		220
Ala Thr Gly Ala Val Leu Ser Ile Thr Asp Ala Lys Gly Asn Leu Gln					
225		230		235	240
Arg Val Ala Tyr Asp Val Ala Gly Leu Leu Ser Gly Ser Trp Leu Thr					
	245		250		255
Leu Lys Asp Gly Thr Glu Gln Val Ile Val Ala Ser Leu Thr Tyr Ser					
	260		265		270
Ala Ala Gly Lys Lys Leu Arg Glu Glu His Gly Asn Gly Val Val Thr					
	275		280		285

Ser Tyr Ile Tyr Glu Pro Glu Thr Gln Arg Leu Thr Gly Ile Lys Thr
 290 295 300

Glu Arg Pro Ser Gly His Val Ala Gly Ala Lys Val Leu Gln Asp Leu
 305 310 315 320

Arg Tyr Thr Tyr Asp Pro Val Gly Asn Val Leu Ser Val Asn Asn Asp
 325 330 335

Ala Glu Glu Thr Arg Phe Trp Arg Asn Gln Lys Val Val Pro Glu Asn
 340 345 350

Thr Tyr Ile Tyr Asp Ser Leu Tyr Gln Leu Val Ser Ala Thr Gly Arg
 355 360 365

Glu Met Ala Asn Ala Gly Gln Gln Gly Asn Asp Leu Pro Ser Ala Thr
 370 375 380

Ala Pro Leu Pro Thr Asp Ser Ser Ala Tyr Thr Asn Tyr Thr Arg Thr
 385 390 395 400

Tyr Arg Tyr Asp Arg Gly Gly Asn Leu Thr Gln Met Arg His Ser Ala
 405 410 415

Pro Ala Thr Asn Asn Asn Tyr Thr Thr Asp Ile Thr Val Ser Asp Arg
 420 425 430

Ser Asn Arg Ala Val Leu Ser Thr Leu Ala Glu Val Pro Ser Asp Val
 435 440 445

Asp Met Leu Phe Ser Ala Gly Gly His Gln Lys His Leu Gln Pro Gly
 450 455 460

Gln Ala Leu Val Trp Thr Pro Arg Gly Glu Leu Gln Lys Val Thr Pro
 465 470 475 480

Val Val Arg Asp Gly Gly Ala Asp Asp Ser Glu Ser Tyr Arg Tyr Asp
 485 490 495

Ala Gly Ser Gln Arg Ile Ile Lys Thr Gly Thr Arg Gln Thr Gly Asn
 500 505 510

Asn Val Gln Thr Gln Arg Val Val Tyr Leu Pro Gly Leu Glu Leu Arg
515 520 525

Ile Met Ala Asn Gly Val Thr Glu Lys Glu Ser Leu Gln Val Ile Thr
530 535 540

Val Gly Glu Ala Gly Arg Ala Gln Val Arg Val Leu His Trp Glu Ile
545 550 555 560

Gly Lys Pro Asp Asp Leu Asp Glu Asp Ser Val Arg Tyr Ser Tyr Asp
565 570 575

Asn Leu Val Gly Ser Ser Gln Leu Glu Leu Asp Arg Glu Gly Tyr Leu
580 585 590

Ile Ser Glu Glu Glu Phe Tyr Pro Tyr Gly Gly Thr Ala Val Leu Thr
595 600 605

Ala Arg Ser Glu Val Glu Ala Asp Tyr Lys Thr Ile Arg Tyr Ser Gly
610 615 620

Lys Glu Arg Asp Ala Thr Gly Leu Asp Tyr Tyr Gly Tyr Arg Tyr Tyr
625 630 635 640

Gln Pro Trp Ala Gly Arg Trp Leu Ser Thr Asp Pro Ala Gly Thr Val
645 650 655

Asp Gly Leu Asn Leu Phe Arg Met Val Arg Asn Asn Pro Val Thr Leu
660 665 670

Phe Asp Ser Asn Gly Arg Ile Ser Thr Gly Gln Glu Ala Arg Arg Leu
675 680 685

Val Gly Glu Ala Phe Val His Pro Leu His Met Pro Val Phe Glu Arg
690 695 700

Ile Ser Val Glu Arg Lys Ile Ser Met Ser Val Arg Glu Ala Gly Ile
705 710 715 720

Tyr Thr Ile Ser Ala Leu Gly Glu Gly Ala Ala Ala Lys Gly His Asn
725 730 735

Ile Leu Glu Lys Thr Ile Lys Pro Gly Ser Leu Lys Ala Ile Tyr Gly
740 745 750

Asp Lys Ala Glu Ser Ile Leu Gly Leu Ala Lys Arg Ser Gly Leu Val
755 760 765

Gly Arg Val Gly Gln Trp Asp Ala Ser Gly Val Arg Gly Ile Tyr Ala
770 775 780

His Asn Arg Pro Gly Gly Glu Asp Leu Val Tyr Pro Val Ser Leu Gln
785 790 795 800

Asn Thr Ser Ala Asn Glu Ile Val Asn Ala Trp Ile Lys Phe Lys Ile
805 810 815

Ile Thr Pro Tyr Thr Gly Asp Tyr Asp Met His Asp Ile Ile Lys Phe
820 825 830

Ser Asp Gly Lys Gly His Val Pro Thr Ala Glu Ser Ser Glu Glu Arg
835 840 845

Gly Val Lys Asp Leu Ile Asn Lys Gly Val Ala Glu Val Asp Pro Ser
850 855 860

Arg Pro Phe Glu Tyr Thr Ala Met Asn Val Ile Arg His Gly Pro Gln
865 870 875 880

Val Asn Phe Val Pro Tyr Met Trp Glu His Glu His Asp Lys Val Val
885 890 895

Asn Asp Asn Gly Tyr Leu Gly Val Val Ala Ser Pro Gly Pro Phe Pro
900 905 910

Val Ala Met Val His Gln Gly Glu Trp Thr Val Phe Asp Asn Ser Glu
915 920 925

Glu Leu Phe Asn Phe Tyr Lys Ser Thr Asn Thr Pro Leu Pro Glu His
930 935 940

Trp Ser Gln Asp Phe Met Asp Arg Gly Lys Gly Ile Val Ala Thr Pro
945 950 955 960

Arg His Ala Glu Leu Leu Asp Lys Arg Arg Val Met Tyr

965

970

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 <211> 2499
 <212> PRT
 <213> Photorhabdus luminescens

<400> 62

Met Asn Thr Leu Lys Ser Glu Tyr Gln Gln Ala Leu Gly Ala Gly Phe
 1 5 10 15

Asn Asn Leu Thr Asp Ile Cys His Leu Ser Phe Asp Glu Leu Arg Lys
 20 25 30

Lys Val Lys Asp Lys Leu Ser Trp Ser Gln Thr Gln Ser Leu Tyr Leu
 35 40 45

Glu Ala Gln Gln Val Gln Lys Asp Asn Leu Leu His Glu Ala Arg Ile
 50 55 60

Leu Lys Arg Ala Asn Pro His Leu Gln Ser Ala Val His Leu Ala Leu
 65 70 75 80

Thr Ala Pro His Ala Asp Gln Gln Gly Tyr Asn Ser Arg Phe Gly Asn
 85 90 95

Arg Ala Ser Lys Tyr Ala Ala Pro Gly Ala Ile Ser Ser Met Phe Ser
 100 105 110

Leu Ala Ala Tyr Leu Thr Glu Leu Tyr Arg Gln Ala Arg Asn Leu His
 115 120 125

Ala Glu Gly Ser Ile Tyr His Leu Asp Thr Arg Arg Pro Asp Leu Lys
 130 135 140

Ser Leu Val Leu Ser Gln Lys Asn Met Asn Thr Glu Ile Ser Thr Leu
 145 150 155 160

Ser Leu Ser Asn Asn Met Leu Leu Asn Ser Ile Lys Thr Gln Pro Asn
 165 170 175

Leu Asn Ser His Ala Lys Val Met Glu Lys Leu Ser Thr Phe Arg Thr
 180 185 190

Ser Gly Ser Met Pro Tyr His Asp Ala Tyr Glu Ser Val Arg Lys Ile
 195 200 205

Ile Gln Leu Gln Ala Pro Val Phe Glu Gln Ser Ser Thr Leu Thr Asp
 210 215 220

Thr Pro Ile Thr Lys Leu Met Tyr Gln Ile Ser Leu Leu Gly Ile Asn
 225 230 235 240

Ala Ser Val Ser Pro Glu Leu Phe Thr Ile Leu Thr Gln Lys Ile Lys
 245 250 255

Pro Ala Thr Asn Ala Asp Asn Thr Asn Glu Leu Lys Lys Leu Tyr Lys
 260 265 270

Lys Asn Phe Gly Glu Ile Lys Ser Ile Gln Met Ala Arg Ala Glu Tyr
 275 280 285

Leu Lys Ser Tyr Tyr Asn Leu Thr Asp Lys Glu Leu Asn Gln Phe Ser
 290 295 300

Lys Lys Ile Lys Gln Ile Asp Ser Leu Trp Asn Ile Gly Asp Glu Ile
 305 310 315 320

Thr Gln Tyr His Leu Leu Lys Phe Asn Lys Ala Ile Asn Leu Ser Arg
 325 330 335

Ser Thr Glu Leu Ser Pro Ile Ile Leu Asn Ser Ile Ala Ile Asp Ile
 340 345 350

Leu Lys Lys Thr Pro Pro Glu Asp Asp Ser Asp Asn Pro Phe Arg Asp
 355 360 365

Asp Pro Asp Tyr Leu Glu Ser Phe Gln Asp Leu Asp Leu Ser Asp Glu
 370 375 380

Pro Asp Ile Asp Glu Asp Val Leu Arg Glu Ala Leu Arg Val Lys Asp
 385 390 395 400

Tyr Met Gln Arg Tyr Gly Ile Asp Ala Glu Thr Ala Leu Ile Leu Cys
 405 410 415

Lys Ala Pro Ile Ser Glu Asn Pro Ser His Pro Asp Leu Ser Lys Leu
 420 425 430

Leu Ala Asp Ile His Gln Leu Thr Ile Asp Glu Leu Gly Val Leu Leu
 435 440 445

Val Ala Ile Asp Glu Gly Lys Thr Asp Leu Ser Gln Ile Thr His Asp
 450 455 460

Asn Leu Ala Val Leu Ile Ser Lys Leu Tyr Ser Val Thr Asn Trp Leu
 465 470 475 480

Arg Thr Arg Lys Trp Ser Val Tyr Gln Leu Phe Val Met Thr Thr Asp
 485 490 495

Lys Tyr Asn Lys Thr Leu Thr Pro Glu Ile Asn Asn Leu Leu Asp Thr
 500 505 510

Val Tyr Asn Gly Leu Gln Asn Phe Tyr Lys Asp Asn Leu Leu Lys Ile
 515 520 525

Lys Asp Asn Leu Leu Lys Ala Lys Glu Ser Leu Pro Glu Asp Lys Asp
 530 535 540

Asn Leu Pro Lys Ala Glu Gln Tyr Leu Leu Glu Ala Glu Lys Tyr Leu
 545 550 555 560

Leu Ala Ala Glu Lys Tyr Leu Leu Ala Ala Glu Lys Tyr Leu Leu Glu
 565 570 575

Ala Asn Lys Asn Pro Leu Glu Ala Lys Lys Ala Leu Lys Glu Tyr Glu
 580 585 590

Lys Asn Gln Glu Ala Tyr Glu Lys Asn Leu Lys Glu His Glu Lys Tyr
 595 600 605

Leu Leu Lys Ala Gly Glu Asn Leu Pro Ala Ile Lys Glu Asn Leu Leu
 610 615 620

Lys Ile Lys Glu Asn Leu Pro Lys Ala Ile Ser Pro Tyr Ile Ala Ala
 625 630 635 640

Ala Leu Gln Leu Pro Ser Glu Asn Val Ala Leu Ser Val Leu Ala Trp

645

650

655

Ala Asp Lys Leu Asn Ser Gly Lys Glu Asn Lys Met Thr Ala Asp Ser
660 665 670

Phe Trp Asn Trp Leu Arg Lys Lys Pro Ile Glu Thr Gln Ser Lys Thr
675 680 685

Thr Glu Ala Thr Glu Ala Thr Glu Ala Thr Glu Ala Thr
690 695 700

Glu Ala Thr Glu Lys Thr Thr Leu Ile Gln Gln Ala Val Gln Tyr Cys
705 710 715 720

Gln Cys Leu Ala Gln Leu Ala Leu Ile Tyr Arg Ser Thr Gly Leu Ser
725 730 735

Glu Ser Thr Leu Arg Leu Phe Val Thr Asn Pro Gln Ile Phe Gly Leu
740 745 750

Thr Ala Lys Thr Thr Ser Thr His Asn Val Leu Ser Leu Ile Met Leu
755 760 765

Thr Arg Phe Thr Asp Trp Val Asn Ser Leu Gly Glu Asn Ala Ser Ser
770 775 780

Val Leu Thr Glu Phe Glu Lys Gly Thr Leu Thr Ala Glu Leu Leu Ala
785 790 795 800

Asn Ala Met Asn Leu Asp Lys Asn Leu Leu Glu Gln Ala Ser Thr Gln
805 810 815

Ala Gln Ala Asp Phe Ser Asn Trp Pro Ser Ile Asp Asn Leu Leu Gln
820 825 830

Trp Ile Asn Ile Ser Arg Gln Leu Asn Ile Ser Pro Gln Gly Val Ser
835 840 845

Glu Leu Ala Lys Ile Leu Asp Ile Glu Ser Ser Thr Asn Tyr Ala Gln
850 855 860

Trp Glu Asn Val Ala Ser Ile Leu Thr Ala Gly Leu Asp Thr Gln Lys
865 870 875 880

His Asn Lys Phe Ser Glu Gly Lys Phe Pro Ala Asn Ala Trp Ser
1085 1090 1095

Glu Trp	His Lys Ile Asp Cys	Pro Ile Asn Pro Tyr	Glu Asp Thr
1100	1105	1110	
Ile Arg	Pro Val Val Tyr Gln	Ser Arg Leu Tyr Ile	Ile Trp Leu
1115	1120	1125	
Glu Gln	Lys Lys Val Thr Asn	Arg Ala Glu Gly Glu	Ala Ile Lys
1130	1135	1140	
Gln Gly	Ser Lys Thr Thr Thr	Ser Tyr His Tyr Glu	Leu Lys Leu
1145	1150	1155	
Ala His	Ile Arg Tyr Asp Gly	Thr Trp Asn Thr Pro	Ile Thr Phe
1160	1165	1170	
Asp Val	Asp Glu Lys Ile Ser	Gly Leu Asn Leu Glu	Leu Asn Lys
1175	1180	1185	
Ala Leu	Gly Leu Tyr Cys Ala	Ser Tyr Gln Gly Lys	Asp Lys Leu
1190	1195	1200	
Leu Val	Met Phe Tyr Lys Lys	Gln Glu Gln Leu Asn	Asn Tyr Thr
1205	1210	1215	
Glu Lys	Thr Gly Asn Thr Tyr	Thr Ala Pro Ile Lys	Gly Leu Tyr
1220	1225	1230	
Ile Thr	Ser Asn Met Ser Pro	Glu Glu Met Thr Pro	Glu Ser Tyr
1235	1240	1245	
Arg Leu	Asn Ala His Lys Gln	Phe Asp Thr Asn Asn	Val Val Arg
1250	1255	1260	
Val Asn	Asn Arg Tyr Ala Glu	Ser Tyr Glu Ile Pro	Ser Ser Val
1265	1270	1275	
Asn Ser	Asn Asn Gly Tyr Asp	Trp Gly Glu Gly Tyr	Leu Ser Met
1280	1285	1290	
Val Tyr	Gly Gly Ser Ile Leu	Ile Thr Arg Asp Pro	Ser Asp Asn
1295	1300	1305	

Ser	Lys	Ile	Gln	Ile	Ser	Pro	Lys	Leu	Arg	Ile	Ile	His	Asn	Gly
1310						1315					1320			
Tyr	Glu	Gly	Arg	Gln	Arg	Asn	Gln	Cys	Asn	Leu	Met	Lys	Lys	Tyr
1325						1330					1335			
Gly	Lys	Leu	Gly	Asp	Lys	Phe	Ile	Ile	Tyr	Thr	Thr	Leu	Gly	Ile
1340						1345					1350			
Asn	Pro	Asn	Asn	Leu	Ser	Asn	Lys	Lys	Leu	Ile	Tyr	Pro	Val	Tyr
1355						1360					1365			
Gln	Tyr	Glu	Gly	Asn	Glu	Ser	Lys	Leu	Ser	Gln	Gly	Arg	Leu	Leu
1370						1375					1380			
Phe	Tyr	Arg	Asp	Ser	Thr	Thr	Asn	Phe	Thr	Arg	Ala	Trp	Phe	Pro
1385						1390					1395			
Asn	Leu	Ser	Ser	Asp	Ser	Lys	Glu	Met	Ser	Ile	Thr	Thr	Gly	Gly
1400						1405					1410			
Asn	Ile	Ser	Gly	Asn	Tyr	Gly	Tyr	Ile	Asp	Asn	Lys	His	Ser	Asp
1415						1420					1425			
Asn	Lys	Pro	Phe	Glu	Glu	Tyr	Phe	Tyr	Met	Asp	Asp	His	Gly	Gly
1430						1435					1440			
Ile	Asp	Thr	Asp	Val	Ser	Glu	Pro	Ile	Phe	Ile	Asn	Thr	Lys	Ile
1445						1450					1455			
Gln	Pro	Ser	Asn	Val	Lys	Ile	Ile	Val	Lys	Thr	Val	Lys	Asp	Asp
1460						1465					1470			
Gly	Lys	Leu	Asp	Ser	Lys	Pro	Tyr	Ile	Ala	Glu	Asp	Lys	Val	Ser
1475						1480					1485			
Val	Lys	Pro	Thr	Pro	Asn	Phe	Glu	Glu	Met	Cys	Tyr	Gln	Phe	Asn
1490						1495					1500			
Asn	Leu	Asp	Gln	Ile	Asp	Val	Ser	Thr	Leu	Val	Phe	Lys	Asn	Asn
1505						1510					1515			
Glu	Ala	Ser	Ile	Asp	Ile	Thr	Phe	Thr	Ala	Ser	Ala	Asp	Ala	Phe

1520		1525		1530
Glu Ser Gly Lys Glu Gln Arg Asn Leu Gly Glu Glu His Phe Ser				
1535		1540		1545
Ile Arg Ile Ile Lys Lys Ala Asn Val Asn Asp Val Leu Thr Leu				
1550		1555		1560
His His Asp Pro Ser Gly Ala Gln Tyr Met Gln Trp Gly Ala Tyr				
1565		1570		1575
Arg Thr Arg Leu Asn Thr Leu Phe Ala Arg Lys Leu Ile Ser Arg				
1580		1585		1590
Ala Asn Ala Gly Ile Asp Thr Ile Leu Ser Met Glu Thr Gln Asn				
1595		1600		1605
Ile Gln Glu Pro Gln Leu Gly Lys Gly Phe Tyr Val Asn Phe Thr				
1610		1615		1620
Leu Pro Lys Tyr Asp Gln Asn Thr His Gly Asn Glu Arg Gln Phe				
1625		1630		1635
Lys Ile His Ile Gly Asn Ile Ala Gly Asp Asn Thr Met Arg Pro				
1640		1645		1650
Tyr Tyr Gln Gly Ile Leu Ala Asp Thr Glu Thr Ser Val Val Leu				
1655		1660		1665
Phe Val Pro Tyr Glu Lys Gln Ser Tyr Thr Asn Glu Gly Val Arg				
1670		1675		1680
Leu Gly Val Glu Tyr Lys Lys Val Ser Tyr Leu Gly Val Trp Glu				
1685		1690		1695
Pro Ala Phe Phe Tyr Phe Asn Glu Ile Gln Gln Lys Phe Ile Leu				
1700		1705		1710
Ile Asn Asp Ala Asp His Asn Ser Ala Met Thr Gln Ser Gly Glu				
1715		1720		1725
Lys Thr Gly Ile Lys Lys Tyr Lys Gly Phe Leu Asp Val Ser Ile				
1730		1735		1740

Gln Val Asn Glu Val Met Leu Ser Tyr Trp Gln Lys Leu Glu Gln
1940 1945 1950

Arg Leu Tyr Asn Leu Arg His Asn Leu Ser Ile Asp Gly Gln Pro 1955 1960 1965
Leu His Leu Pro Ile Phe Ala Thr Pro Ala Asp Pro Lys Ala Leu 1970 1975 1980
Leu Ser Ala Ala Val Ala Ser Ser Gln Gly Gly Ser Asn Leu Pro 1985 1990 1995
Ser Glu Phe Ile Ser Val Trp Arg Phe Pro His Met Leu Glu Asn 2000 2005 2010
Ala Arg Ser Met Val Ser Gln Leu Thr Gln Phe Gly Ser Thr Leu 2015 2020 2025
Gln Asn Ile Ile Glu Arg Gln Asp Ala Glu Ala Leu Asn Thr Leu 2030 2035 2040
Leu Gln Asn Gln Ala Ala Glu Leu Ile Leu Thr Asn Leu Ser Ile 2045 2050 2055
Gln Asp Lys Thr Ile Glu Glu Leu Asp Val Glu Lys Thr Val Leu 2060 2065 2070
Glu Lys Thr Arg Ala Gly Ala Lys Ser Arg Phe Asp Ser Tyr Ser 2075 2080 2085
Lys Phe Tyr Asp Glu Asp Ile Asn Ala Gly Glu Lys Gln Ala Met 2090 2095 2100
Ala Leu Arg Ala Ser Val Ala Gly Ile Ser Thr Ala Leu Gln Ala 2105 2110 2115
Ser His Leu Ala Gly Ala Ala Leu Asp Leu Ala Pro Asn Ile Phe 2120 2125 2130
Gly Phe Ala Asp Gly Gly Ser His Trp Gly Ala Ile Ala Gln Ala 2135 2140 2145
Thr Ser Asn Val Met Glu Phe Ser Ala Ser Val Met Ser Thr Glu 2150 2155 2160

Ala Asp	Lys Ile Ser Gln Ser	Glu Ala Tyr Arg Arg	Arg Arg Gln
2165	2170	2175	
Glu Trp	Lys Ile Gln Arg Asn	Asn Ala Asp Ala Glu	Leu Lys Gln
2180	2185	2190	
Ile Asp	Ala Gln Leu Gln Ser	Leu Val Val Arg Arg	Glu Ala Ala
2195	2200	2205	
Val Leu	Gln Lys Thr Ser Leu	Lys Thr Gln Gln Glu	Gln Thr His
2210	2215	2220	
Ala Gln	Leu Thr Phe Leu Gln	His Lys Phe Ser Asn	Gln Ala Leu
2225	2230	2235	
Tyr Asn	Trp Leu Arg Gly Arg	Leu Ser Ala Ile Tyr	Phe Gln Phe
2240	2245	2250	
Tyr Asp	Leu Ala Val Ala Arg	Cys Leu Met Ala Glu	Met Ala Tyr
2255	2260	2265	
Arg Trp	Glu Thr Asn Asp Ala	Ala Ala Arg Phe Ile	Lys Pro Gly
2270	2275	2280	
Ala Trp	Gln Gly Thr His Ala	Gly Leu Leu Ala Gly	Glu Thr Leu
2285	2290	2295	
Met Leu	Asn Leu Ala Gln Met	Glu Asp Ala His Leu	Lys Gln Glu
2300	2305	2310	
Gln Arg	Val Leu Glu Val Glu	Arg Thr Val Ser Leu	Ala Glu Val
2315	2320	2325	
Tyr Lys	Glu Lys Gly Gln Phe	Ser Leu Thr Lys Lys	Ile Ala Glu
2330	2335	2340	
Leu Val	Asn Lys Lys Pro Asp	Thr Thr Ser Ser Arg	Asn Asn Thr
2345	2350	2355	
Leu Asn	Phe Gly Glu Gly Asn	Ala Lys Thr Ser Leu	Gln Ala Ser
2360	2365	2370	
Ile Ser	Leu Ala Asp Leu Gln	Ile Arg His Asp Tyr	Pro Glu Asn

2375 2380 2385
 Ser Gly Ala Gly Asn Val Arg Arg Ile Lys Gln Ile Ser Val Thr
 2390 2395 2400

 Leu Pro Ala Leu Leu Gly Pro Tyr Gln Asp Val Gln Ala Ile Leu
 2405 2410 2415

 Ser Tyr Gly Gly Asp Ala Thr Gly Leu Ala Lys Gly Cys Lys Ala
 2420 2425 2430

 Leu Ala Val Ser His Gly Met Asn Asp Ser Gly Gln Phe Gln Leu
 2435 2440 2445

 Asp Phe Asn Asp Gly Lys Phe Leu Pro Phe Glu Gly Ile Glu Ile
 2450 2455 2460

 Asp Lys Gly Thr Leu Thr Leu Ser Phe Pro Asn Ala Thr Glu Lys
 2465 2470 2475

 Gln Lys Thr Met Leu Glu Ser Ile Ser Asp Ile Ile Leu His Ile
 2480 2485 2490

 Arg Tyr Thr Ile Arg Gln
 2495

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 <211> 2381
 <212> PRT
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<400> 63

Met Asn Ser Tyr Val Lys Glu Ile Pro Asp Val Leu Gln Ser Gln Tyr
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 Gly Ile Asn Cys Leu Thr Asp Ile Cys His Tyr Ser Phe Asn Glu Phe
 20 25 30

 Arg Gln Gln Val Ser Asp His Leu Ser Trp Ser Glu Thr Asn Arg Leu
 35 40 45

 Tyr Arg Asp Ala Gln Gln Glu Gln Lys Glu Asn Gln Leu Tyr Glu Ala
 50 55 60

Arg Ile Leu Lys Arg Ala Asn Pro Gln Leu Gln Asn Ala Val His Leu
65 70 75 80

Gly Ile Thr Leu Pro His Ala Glu Leu Arg Gly Tyr Asn Ser Glu Phe
85 90 95

Gly Gly Arg Ala Ser Gln Tyr Val Ala Pro Gly Ser Val Ser Ser Met
100 105 110

Phe Ser Pro Ala Ala Tyr Leu Thr Glu Leu Tyr Arg Glu Ala Arg Asn
115 120 125

Leu His Ala Ser Asp Ser Val Tyr His Leu Asp Glu Arg Arg Pro Asp
130 135 140

Leu Gln Ser Met Thr Leu Ser Gln Gln Asn Met Asp Thr Glu Leu Ser
145 150 155 160

Thr Leu Ser Leu Ser Asn Glu Ile Leu Leu Lys Gly Ile Lys Ala Asn
165 170 175

Gln Ser Asn Leu Asp Ser Asp Thr Lys Val Met Glu Met Leu Ser Thr
180 185 190

Phe Arg Pro Ser Gly Thr Ile Pro Tyr His Asp Ala Tyr Glu Asn Val
195 200 205

Arg Lys Ala Ile Gln Leu Gln Asp Pro Lys Leu Glu Gln Phe Gln Lys
210 215 220

Ser Pro Ala Val Ala Gly Leu Met His Gln Ala Ser Leu Leu Gly Ile
225 230 235 240

Asn Asn Ser Ile Ser Pro Glu Leu Phe Asn Ile Leu Thr Glu Glu Ile
245 250 255

Thr Glu Ala Asn Ala Glu Ala Ile Tyr Lys Gln Asn Phe Gly Asp Ile
260 265 270

Asp Pro Ala Cys Leu Ala Met Pro Glu Tyr Leu Lys Ser Tyr Tyr Asn
275 280 285

Phe Ser Asp Glu Glu Leu Ser Gln Phe Ile Arg Lys Tyr Pro Asp Asn
 290 295 300

Glu Leu Asn Thr Gln Lys Ile His Leu Leu Lys Ile Asn Lys Ile Ile
 305 310 315 320

Leu Leu Ser Gln Ala Val Asn Leu Pro Phe Leu Lys Leu Asp Glu Ile
 325 330 335

Ile Pro Glu Gln Asn Ile Thr Pro Thr Val Leu Gly Lys Ile Phe Leu
 340 345 350

Val Lys Tyr Tyr Met Gln Lys Tyr Asn Ile Gly Thr Glu Thr Ala Leu
 355 360 365

Ile Leu Cys Asn Asp Ser Ile Ser Gln Tyr Ser Tyr Ser Asn Gln Pro
 370 375 380

Ser Gln Phe Asp Arg Leu Phe Asn Thr Ser Pro Leu Asn Gly Gln Tyr
 385 390 395 400

Phe Val Ile Glu Asp Thr Asn Ile Asp Leu Ser Leu Asn Ser Thr Asp
 405 410 415

Asn Trp His Lys Ala Val Leu Lys Arg Ala Phe Asn Val Asp Asp Ile
 420 425 430

Ser Leu Tyr Arg Leu Leu His Ile Ala Asn His Asn Asn Thr Asp Gly
 435 440 445

Lys Ile Ala Asn Asn Ile Lys Asn Leu Ser Asn Leu Tyr Met Thr Lys
 450 455 460

Leu Leu Ala Asp Ile His Gln Leu Thr Ile Asp Glu Leu Tyr Leu Leu
 465 470 475 480

Leu Ile Thr Ile Gly Glu Asp Lys Ile Asn Leu Tyr Asp Ile Asp Asp
 485 490 495

Lys Glu Leu Glu Lys Leu Ile Asn Arg Leu Asp Thr Leu Ser Asn Trp
 500 505 510

Leu His Thr Gln Lys Trp Ser Ile Tyr Gln Leu Phe Leu Met Thr Thr

515	520	525
Thr Asn Tyr Asp Lys Thr Leu Thr Pro Glu Ile Gln Asn Leu Leu Asp 530 535 540		
Thr Val Tyr Asn Gly Leu Gln Asn Phe Asp Lys Asn Lys Thr Lys Leu 545 550 555 560		
Leu Ala Ala Ile Ala Pro Tyr Ile Ala Ala Thr Leu Gln Leu Pro Ser 565 570 575		
Glu Asn Val Ala His Ser Ile Leu Leu Trp Ala Asp Lys Ile Lys Pro 580 585 590		
Ser Glu Asn Lys Ile Thr Ala Glu Lys Phe Trp Ile Trp Leu Gln Asn 595 600 605		
Arg Asp Thr Thr Glu Leu Ser Lys Pro Pro Glu Met Gln Glu Gln Ile 610 615 620		
Ile Gln Tyr Cys His Cys Leu Ala Gln Leu Thr Met Ile Tyr Arg Ser 625 630 635 640		
Ser Gly Ile Asn Glu Asn Ala Phe Arg Leu Phe Ile Glu Lys Pro Thr 645 650 655		
Ile Phe Gly Ile Pro Asp Glu Pro Asn Lys Ala Thr Pro Ala His Asn 660 665 670		
Ala Pro Thr Leu Ile Ile Leu Thr Arg Phe Ala Asn Trp Val Asn Ser 675 680 685		
Leu Gly Glu Lys Ala Ser Pro Ile Leu Thr Ala Phe Glu Asn Lys Thr 690 695 700		
Leu Thr Ala Glu Lys Leu Ala Asn Ala Met Asn Leu Asp Ala Asn Leu 705 710 715 720		
Leu Glu Gln Ala Ser Ile Gln Ala Gln Asn Tyr Lys Gln Val Thr Lys 725 730 735		
Glu Asn Thr Phe Ser Asn Trp Gln Ser Ile Asp Ile Ile Leu Gln Trp 740 745 750		

Thr Asn Ile Ala Ser Asn Leu Asn Ile Ser Pro Gln Gly Ile Ser Pro
755 760 765

Leu Ile Ala Leu Asp Tyr Ile Lys Pro Ala Gln Lys Thr Pro Thr Tyr
770 775 780

Ala Gln Trp Glu Asn Ala Ala Ile Ala Leu Thr Ala Gly Leu Asp Thr
785 790 795 800

Gln Gln Thr His Thr Leu His Val Phe Leu Asp Glu Ser Arg Ser Thr
805 810 815

Ala Leu Ser Asn Tyr Tyr Ile Gly Lys Val Ala Asn Arg Ala Ala Ser
820 825 830

Ile Lys Ser Arg Asp Asp Leu Tyr Gln Tyr Leu Leu Ile Asp Asn Gln
835 840 845

Val Ser Ala Glu Ile Lys Thr Thr Arg Ile Ala Glu Ala Ile Ala Ser
850 855 860

Ile Gln Leu Tyr Val Asn Arg Ala Leu Glu Asn Ile Glu Ile His Ala
865 870 875 880

Val Ser Asp Val Ile Thr Arg Gln Phe Phe Ile Asp Trp Asp Lys Tyr
885 890 895

Asn Lys Arg Tyr Ser Thr Trp Ala Gly Val Ser Gln Leu Val Tyr Tyr
900 905 910

Pro Glu Asn Tyr Ile Asp Pro Thr Met Arg Ile Gly Gln Thr Lys Met
915 920 925

Met Asp Thr Leu Leu Gln Ser Val Ser Gln Ser Gln Leu Asn Ala Asp
930 935 940

Thr Val Glu Asp Ala Phe Lys Ser Tyr Leu Thr Ser Phe Glu Gln Val
945 950 955 960

Ala Asn Leu Glu Val Ile Ser Ala Tyr His Asp Asn Val Asn Asn Asp
965 970 975

Gln Gly Leu Thr Tyr Phe Ile Gly Asn Ser Lys Thr Glu Val Asn Gln
 980 985 990

Tyr Tyr Trp Arg Ser Val Asp His Ser Lys Phe Asn Asp Gly Lys Phe
 995 1000 1005

Ala Ala Asn Ala Trp Ser Glu Trp His Lys Ile Asp Cys Ala Ile
 1010 1015 1020

Asn Pro Tyr Gln Ser Thr Ile Arg Pro Val Ile Tyr Lys Ser Arg
 1025 1030 1035

Leu Tyr Leu Ile Trp Leu Glu Gln Lys Glu Thr Ala Lys Gln Lys
 1040 1045 1050

Glu Asp Asn Lys Val Thr Thr Asp Tyr His Tyr Glu Leu Lys Leu
 1055 1060 1065

Ala His Ile Arg Tyr Asp Gly Thr Trp Asn Val Pro Ile Thr Phe
 1070 1075 1080

Asp Val Asp Glu Lys Ile Leu Ala Leu Glu Leu Thr Lys Ser Gln
 1085 1090 1095

Ala Pro Gly Leu Tyr Cys Ala Gly Tyr Gln Gly Glu Asp Thr Leu
 1100 1105 1110

Leu Ile Met Phe Tyr Arg Lys Lys Glu Lys Leu Asp Asp Tyr Lys
 1115 1120 1125

Thr Ala Pro Met Gln Gly Phe Tyr Ile Phe Ser Asp Met Ser Ser
 1130 1135 1140

Lys Asp Met Thr Asn Glu Gln Cys Asn Ser Tyr Arg Asp Asn Gly
 1145 1150 1155

Tyr Thr His Phe Asp Thr Asn Ser Asp Thr Asn Ser Val Ile Arg
 1160 1165 1170

Ile Asn Asn Arg Tyr Ala Glu Asp Tyr Glu Ile Pro Ser Leu Ile
 1175 1180 1185

Asn	His	Ser	Asn	Ser	His	Asp	Trp	Gly	Glu	Tyr	Asn	Leu	Ser	Gln
1190						1195					1200			
Val	Tyr	Gly	Gly	Asn	Ile	Val	Ile	Asn	Tyr	Lys	Val	Thr	Ser	Asn
1205						1210					1215			
Asp	Leu	Lys	Ile	Tyr	Ile	Ser	Pro	Lys	Leu	Arg	Ile	Ile	His	Asp
1220						1225					1230			
Gly	Lys	Glu	Gly	Arg	Glu	Arg	Ile	Gln	Ser	Asn	Leu	Ile	Lys	Lys
1235						1240					1245			
Tyr	Gly	Lys	Leu	Gly	Asp	Lys	Phe	Ile	Ile	Tyr	Thr	Ser	Leu	Gly
1250						1255					1260			
Ile	Asn	Pro	Asn	Asn	Ser	Ser	Asn	Arg	Phe	Met	Phe	Tyr	Pro	Val
1265						1270					1275			
Tyr	Gln	Tyr	Asn	Gly	Asn	Thr	Ser	Gly	Leu	Ala	Gln	Gly	Arg	Leu
1280						1285					1290			
Leu	Phe	His	Arg	Asp	Thr	Ser	Tyr	Ser	Ser	Lys	Val	Ala	Ala	Trp
1295						1300					1305			
Ile	Pro	Gly	Ala	Gly	Arg	Ser	Leu	Ile	Asn	Glu	Asn	Ala	Asn	Ile
1310						1315					1320			
Gly	Asp	Asp	Cys	Ala	Glu	Asp	Ser	Val	Asn	Lys	Pro	Asp	Asp	Leu
1325						1330					1335			
Lys	Gln	Tyr	Ile	Tyr	Met	Thr	Asp	Ser	Lys	Gly	Thr	Ala	Thr	Asp
1340						1345					1350			
Val	Ser	Gly	Pro	Val	Asp	Ile	Asn	Thr	Ala	Ile	Ser	Ser	Glu	Lys
1355						1360					1365			
Val	Gln	Ile	Thr	Ile	Lys	Ala	Gly	Lys	Glu	Tyr	Ser	Leu	Thr	Ala
1370						1375					1380			
Asn	Lys	Asp	Val	Ser	Val	Gln	Pro	Ser	Pro	Ser	Phe	Glu	Glu	Met
1385						1390					1395			
Cys	Tyr	Gln	Phe	Asn	Ala	Leu	Glu	Ile	Asp	Gly	Ser	Asn	Leu	Asn

1400		1405		1410
Phe Thr Asn Asn Ser Ala Ser Ile Asp Val Thr Phe Thr Ala Leu				
1415		1420		1425
Ala Asp Asp Gly Arg Lys Leu Gly Tyr Glu Ile Phe Asn Ile Pro				
1430		1435		1440
Val Ile Gln Lys Val Lys Thr Asp Asn Ala Leu Thr Leu Phe His				
1445		1450		1455
Asp Glu Asn Gly Ala Gln Tyr Met Gln Trp Gly Ala Tyr Arg Ile				
1460		1465		1470
Arg Leu Asn Thr Leu Phe Ala Arg Gln Leu Val Glu Arg Ala Asn				
1475		1480		1485
Thr Gly Ile Asp Thr Ile Leu Ser Met Glu Thr Gln Asn Ile Gln				
1490		1495		1500
Glu Pro Met Met Gly Ile Gly Ala Tyr Ile Glu Leu Ile Leu Asp				
1505		1510		1515
Lys Tyr Asn Pro Asp Ile His Gly Thr Asn Lys Ser Phe Lys Ile				
1520		1525		1530
Ile Tyr Gly Asp Ile Phe Lys Ala Gly Asp His Phe Pro Ile Tyr				
1535		1540		1545
Gln Gly Ala Leu Ser Asp Ile Thr Gln Thr Thr Val Lys Leu Phe				
1550		1555		1560
Leu Pro Arg Val Asp Asn Ala Tyr Gly Asn Lys Asn Asn Leu Tyr				
1565		1570		1575
Val Tyr Ala Ala Tyr Gln Lys Val Glu Thr Asn Phe Ile Arg Phe				
1580		1585		1590
Val Lys Glu Asp Asn Asn Lys Pro Ala Thr Phe Asp Thr Thr Tyr				
1595		1600		1605
Lys Asn Gly Thr Phe Pro Gly Leu Ala Ser Ala Arg Val Ile Gln				
1610		1615		1620

Thr Val	Ser Glu Pro Met	Asp	Phe Ser Gly Ala	Asn	Ser Leu Tyr
1625		1630		1635	
Phe Trp	Glu Leu Phe Tyr	Tyr	Thr Pro Met Met	Val	Ala Gln Arg
1640		1645		1650	
Leu Leu	His Glu Gln Asn	Phe	Asp Glu Ala Asn	Arg	Trp Leu Lys
1655		1660		1665	
Tyr Val	Trp Ser Pro Ser	Gly	Tyr Ile Val Arg	Gly	Gln Ile Lys
1670		1675		1680	
Asn Tyr	His Trp Asn Val	Arg	Pro Leu Leu Glu	Asn	Thr Ser Trp
1685		1690		1695	
Asn Ser	Asp Pro Leu Asp	Ser	Val Asp Pro Asp	Ala	Val Ala Gln
1700		1705		1710	
His Asp	Pro Met His Tyr	Lys	Val Ala Thr Phe	Met	Arg Thr Leu
1715		1720		1725	
Asp Leu	Leu Met Ala Arg	Gly	Asp His Ala Tyr	Arg	Gln Leu Glu
1730		1735		1740	
Arg Asp	Thr Leu Asn Glu	Ala	Lys Met Trp Tyr	Met	Gln Ala Leu
1745		1750		1755	
His Leu	Leu Gly Asn Lys	Pro	Tyr Leu Pro Leu	Ser	Ser Val Trp
1760		1765		1770	
Asn Asp	Pro Arg Leu Asp	Asn	Ala Ala Ala Thr	Thr	Thr Gln Lys
1775		1780		1785	
Ala His	Ala Tyr Ala Ile	Thr	Ser Leu Arg Gln	Gly	Thr Gln Thr
1790		1795		1800	
Pro Ala	Leu Leu Leu Arg	Ser	Ala Asn Thr Leu	Thr	Asp Leu Phe
1805		1810		1815	
Leu Pro	Gln Ile Asn Asp	Val	Met Leu Ser Tyr	Trp	Asn Lys Leu
1820		1825		1830	

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Ile Glu Ala Glu Lys Val Ser Gln Ser Glu Ile Trp Arg Arg Arg
 2045 2050 2055

Arg Gln Glu Trp Glu Ile Gln Arg Asn Asn Ala Glu Ala Glu Met
 2060 2065 2070

Lys Gln Ile Asp Ala Gln Leu Lys Ser Leu Thr Val Arg Arg Glu
 2075 2080 2085

Ala Ala Val Leu Gln Lys Thr Gly Leu Lys Thr Gln Gln Glu Gln
 2090 2095 2100

Thr Gln Ala Gln Leu Ala Phe Leu Gln Arg Lys Phe Ser Asn Gln
 2105 2110 2115

Ala Leu Tyr Asn Trp Leu Arg Gly Arg Leu Ala Ala Ile Tyr Phe
 2120 2125 2130

Gln Phe Tyr Asp Leu Val Val Ala Arg Cys Leu Met Ala Glu Gln
 2135 2140 2145

Ala Tyr Arg Trp Glu Thr Asn Asp Ser Ser Ala Arg Phe Ile Lys
 2150 2155 2160

Pro Gly Ala Trp Gln Gly Thr Tyr Ala Gly Leu Leu Ala Gly Glu
 2165 2170 2175

Thr Leu Met Leu Asn Leu Ala Gln Met Glu Asp Ala His Leu Lys
 2180 2185 2190

Gln Glu Gln Arg Ala Leu Glu Val Glu Arg Thr Val Ser Leu Ala
 2195 2200 2205

Gln Val Tyr Gln Ser Leu Gly Glu Lys Ser Phe Ala Leu Lys Asp
 2210 2215 2220

Lys Ile Glu Ala Leu Leu Gln Gly Asp Lys Glu Thr Ser Ala Gly
 2225 2230 2235

Asn Asp Gly Asn Gln Leu Lys Leu Thr Asn Asn Thr Leu Ser Ala
 2240 2245 2250

Thr Leu Thr Leu Gln Asp Leu Lys Leu Lys Asp Asp Tyr Pro Glu

2255 2260 2265
 Glu Met Gln Leu Gly Lys Thr Arg Arg Ile Lys Gln Ile Ser Val
 2270 2275 2280
 Ser Leu Pro Ala Leu Leu Gly Pro Tyr Gln Asp Val Gln Ala Val
 2285 2290 2295
 Leu Ser Tyr Gly Gly Asp Ala Thr Gly Leu Ala Lys Gly Cys Lys
 2300 2305 2310
 Ala Leu Ala Val Ser His Gly Leu Asn Asp Asn Gly Gln Phe Gln
 2315 2320 2325
 Leu Asp Phe Asn Asp Gly Lys Phe Leu Pro Phe Glu Gly Ile Asp
 2330 2335 2340
 Ile Asn Asp Lys Gly Thr Phe Thr Leu Ser Phe Pro Asn Ala Ala
 2345 2350 2355
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 2360 2365 2370
 His Ile Arg Tyr Thr Ile Leu Glu
 2375 2380

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 <212> PRT
 <213> Photorhabdus luminescens

<400> 64

Met Lys Asn Ile Asp Pro Lys Leu Tyr Gln His Thr Pro Thr Val Asn
 1 5 10 15
 Val Tyr Asp Asn Arg Gly Leu Thr Ile Arg Asn Ile Asp Phe His Arg
 20 25 30
 Asp Val Ala Gly Gly Asp Thr Asp Thr Arg Ile Thr Arg His Gln Tyr
 35 40 45
 Asp Thr Arg Gly His Leu Ser Gln Ser Ile Asp Pro Arg Leu Tyr Asp
 50 55 60

Ala Lys Gln Thr Asn Asn Ser Thr Asn Pro Asn Phe Leu Trp Gln Tyr
65 70 75 80

Asn Leu Thr Gly Asp Thr Leu Arg Thr Glu Ser Val Asp Ala Gly Arg
85 90 95

Thr Val Ala Leu Asn Asp Ile Glu Gly Arg Gln Val Leu Ile Val Thr
100 105 110

Ala Thr Gly Ala Ile Gln Thr Arg Gln Tyr Glu Ala Asn Thr Leu Pro
115 120 125

Gly Arg Leu Leu Ser Val Ser Glu Gln Ala Pro Gly Glu Gln Thr Pro
130 135 140

Arg Val Thr Glu His Phe Ile Trp Ala Gly Asn Thr Gln Ala Glu Lys
145 150 155 160

Asp His Asn Leu Ala Gly Gln Tyr Val Arg His Tyr Asp Thr Ala Gly
165 170 175

Val Thr Gln Leu Glu Ser Leu Ser Leu Thr Glu Asn Ile Leu Ser Gln
180 185 190

Ser Arg Gln Leu Leu Ala Asp Gly Gln Glu Ala Asp Trp Thr Gly Asn
195 200 205

Asp Glu Thr Leu Trp Gln Thr Lys Leu Asn Ser Glu Thr Tyr Thr Thr
210 215 220

Gln Ser Thr Phe Asp Ala Thr Gly Ala Leu Leu Thr Gln Thr Asp Ala
225 230 235 240

Lys Gly Asn Met Gln Arg Leu Ala Tyr Asn Val Ala Gly Gln Leu Gln
245 250 255

Gly Ser Trp Leu Thr Leu Lys Asn Gln Ser Glu Gln Val Ile Val Lys
260 265 270

Ser Leu Thr Tyr Ser Ala Ala Gly Gln Lys Leu Arg Glu Glu His Gly
275 280 285

Asn Gly Val Ile Thr Glu Tyr Ser Tyr Glu Pro Glu Thr Leu Arg Leu
 290 295 300

Ile Gly Thr Thr Thr Arg Arg Gln Ser Asp Ser Lys Val Leu Gln Asp
 305 310 315 320

Leu Arg Tyr Glu His Asp Pro Val Gly Asn Ile Ile Ser Val Arg Asn
 325 330 335

Asp Ala Glu Ala Thr Arg Phe Trp Arg Asn Gln Lys Ile Val Pro Glu
 340 345 350

Asn Thr Tyr Thr Tyr Asp Ser Leu Tyr Gln Leu Ile Ser Ala Thr Gly
 355 360 365

Arg Glu Met Ala Asn Ile Gly Gln Gln Ser Asn Gln Leu Pro Ser Pro
 370 375 380

Ile Ile Pro Leu Pro Thr Asp Glu Asn Ser Tyr Thr Asn Tyr Thr Arg
 385 390 395 400

Ser Tyr Asn Tyr Asp Arg Gly Gly Asn Leu Val Gln Ile Arg His Ser
 405 410 415

Ser Pro Ala Ala Gln Asn Asn Tyr Thr Thr Asp Ile Thr Val Ser Asn
 420 425 430

Arg Ser Asn Arg Ala Val Leu Ser Ser Leu Thr Ser Asp Pro Thr Gln
 435 440 445

Val Glu Ala Leu Phe Asp Ala Gly Gly His Gln Thr Lys Leu Leu Pro
 450 455 460

Gly Gln Glu Leu Ser Trp Asn Thr Arg Gly Glu Leu Lys Gln Val Thr
 465 470 475 480

Pro Val Ser Arg Glu Ser Ala Ser Asp Arg Glu Trp Tyr Arg Tyr Gly
 485 490 495

Asn Asp Gly Met Arg Arg Leu Lys Val Ser Glu Gln Gln Thr Gly Asn
 500 505 510

Ser Thr Gln Gln Gln Arg Val Thr Tyr Leu Pro Asp Leu Glu Leu Arg

515	520	525
Thr Thr Gln Asn Gly Thr Thr Thr Ser Glu Asp Leu His Ala Ile Thr		
530	535	540
Val Gly Ala Ala Gly His Ala Gln Val Arg Val Leu His Trp Glu Thr		
545	550	555
Thr Pro Pro Ala Gly Ile Asn Asn Asn Gln Leu Arg Tyr Ser Tyr Asp		
	565	570
		575
Asn Leu Ile Gly Ser Ser Gln Leu Glu Leu Asp Asn Ala Gly Gln Ile		
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		590
Ile Ser Gln Glu Glu Tyr Tyr Pro Phe Gly Gly Thr Ala Leu Trp Ala		
	595	600
		605
Ala Arg Asn Gln Ile Glu Ala Ser Tyr Lys Ile Leu Arg Tyr Ser Gly		
	610	615
		620
Lys Glu Arg Asp Ala Thr Gly Leu Tyr Tyr Tyr Gly Tyr Arg Tyr Tyr		
625	630	635
		640
Gln Pro Trp Val Gly Arg Trp Leu Ser Ala Asp Pro Ala Gly Thr Ile		
	645	650
		655
Asp Gly Leu Asn Leu Tyr Arg Met Val Arg Asn Asn Pro Ser Thr Leu		
	660	665
		670
Val Asp Ile Ser Gly Leu Ala Pro Thr Lys Tyr Asn Ile Pro Gly Phe		
	675	680
		685
Asp Phe Asp Val Glu Ile Asp Glu Gln Lys Arg Ser Lys Leu Lys Pro		
	690	695
		700
Thr Leu Ile Arg Ile Lys Asp Glu Phe Leu His Tyr Gly Pro Val Asp		
705	710	715
		720
Lys Leu Leu Glu Glu Lys Lys Pro Gly Leu Asn Val Pro Glu Glu Leu		
	725	730
		735
Phe Asp Arg Gly Pro Ser Glu Asn Gly Val Ser Thr Leu Thr Phe Lys		
	740	745
		750

Lys Asp Leu Pro Ile Ser Cys Ile Ser Asn Thr Glu Tyr Thr Leu Asp
 755 760 765

Ile Leu Tyr Asn Lys His Glu Thr Lys Pro Phe Pro Tyr Glu Asn Glu
 770 775 780

Ala Thr Val Gly Ala Asp Leu Gly Val Ile Met Ser Val Glu Phe Gly
 785 790 795 800

Asn Lys Ser Ile Gly Asn Ala Ser Asp Glu Asp Leu Lys Glu Glu His
 805 810 815

Leu Pro Leu Gly Lys Ser Thr Met Asp Lys Thr Asp Leu Pro Asp Leu
 820 825 830

Lys Gln Gly Leu Met Ile Ala Glu Lys Ile Lys Ser Gly Lys Gly Ala
 835 840 845

Tyr Pro Phe His Phe Gly Ala Ala Ile Ala Val Val Tyr Gly Glu Asp
 850 855 860

Lys Lys Val Ala Ala Ser Ile Leu Thr Asp Leu Ser Glu Pro Lys Arg
 865 870 875 880

Asp Glu Gly Glu Tyr Leu Gln Ser Thr Arg Lys Val Ser Ala Met Phe
 885 890 895

Ile Thr Asn Val Asn Glu Phe Arg Gly His Asp Tyr Pro Lys Ser Lys
 900 905 910

Tyr Ser Ile Gly Leu Val Thr Ala Glu Lys Arg Gln Pro Val Ile Ser
 915 920 925

Lys Lys Arg Ala Asn Pro Glu Glu Ala Pro Ser Ser Ser Arg Asn Lys
 930 935 940

Lys Leu His Val His
 945